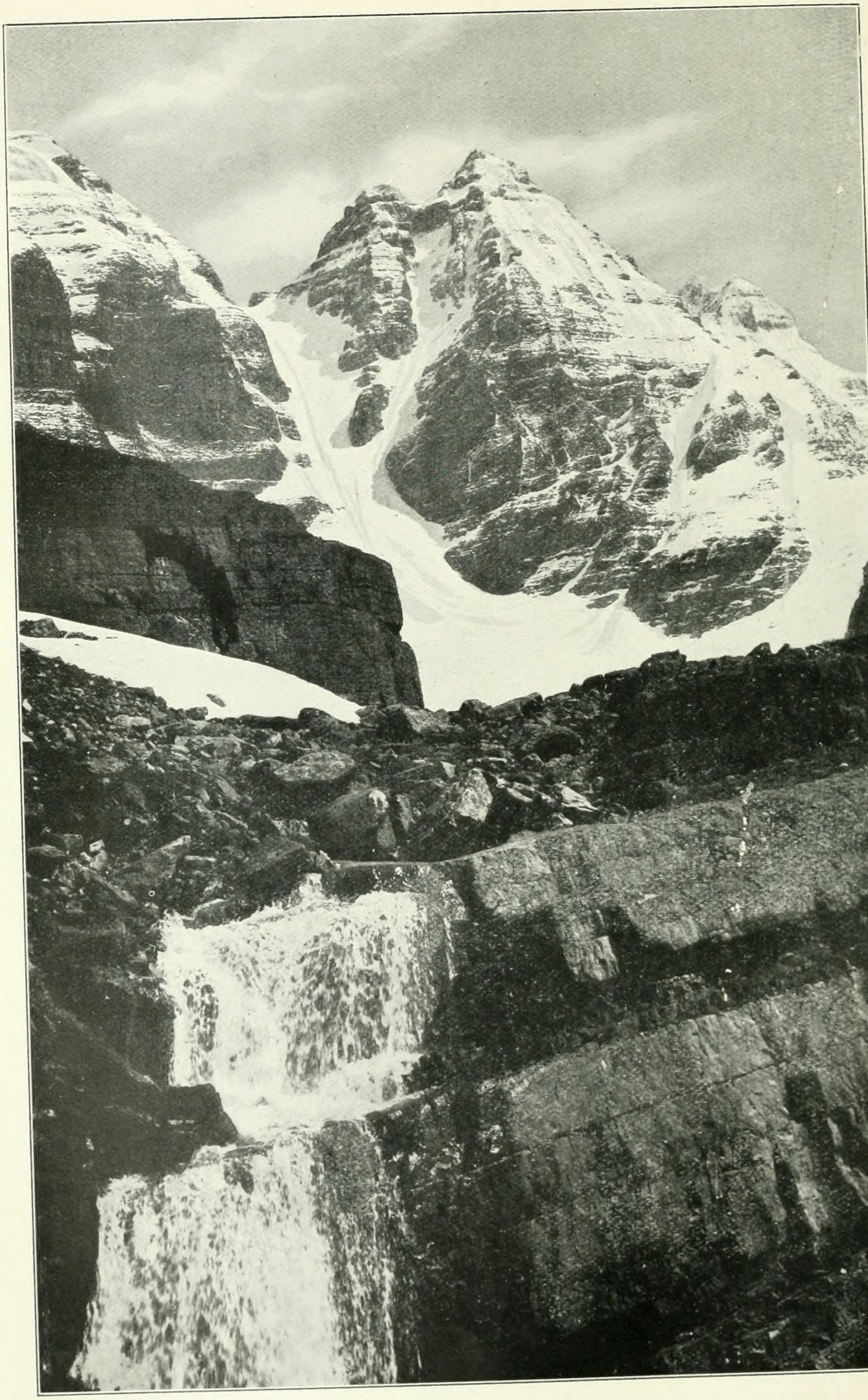
PLATE NO. I



Mount Ringrose, near Laggan, Alberta.

DEPARTMENT OF THE INTERIOR

DOMINION OF CANADA

Irrigation Branch.

REPORT

OF

Progress of Stream Measurements

FOR

THE CALENDAR YEAR 1913

PREPARED UNDER THE DIRECTION OF

F. H. PETERS, C. E.,
COMMISSIONER OF IRRIGATION.

BY

P. M. SAUDER, M. Can. Soc. C.E., Chief Hydrographer;

Assisted by G. H. WHYTE and G. R. ELLIOTT, B.A. Sc.

PRINTED BY ORDER OF PARLIAMENT

OTTAWA

PRINTED BY J. de L. TACHE, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY

1915

No. 25c.—1914

CONTENTS

	PAGE
Introduction	7
Scope of work	7
Organization	7
Banff district	8
Calgary district	9
Macleod district	9
Cardston district	10
Milk River district	11
Western Cypress Hills district	11
Eastern Cypress Hills district	12
Saskatoon district	13
Edmonton district	14
Athabasca district	14
Current Meter Rating Station	15
Bench-Marks	15
Office Work	15
Conventions and Conferences	16
Future Work	16
Definitions	17
Explanation and use of tables	17
Convenient equivalents	18
Methods of measuring stream flow	18
Methods of determining mean velocity	21
Gauging stations	22
Low velocity limitations	22
Office computations	23
Winter records	24
Rating current meters	26
Athabasca River drainage basin	27
North Saskatchewan River drainage basin	36
South Saskatchewan River drainage basin	59
Red Deer River drainage basin	65
Bow River drainage basin	68
Little Bow River drainage basin	140
Oldman River drainage basin	144
Waterton River drainage basin	182
Belly River drainage basin	186
St.Mary River drainage basin	199
Milk River drainage basin	217
Pakowki River drainage basin	245
Sage Creek drainage basin	247
Lodge Creek drainage basin	248
Battle Creek drainage basin	262
Frenchman River drainage basin	281
Swiftcurrent Creek drainage basin	310
Antelope Lake drainage basin	328
Lake of the Narrows drainage basin	333
Crane Lake drainage basin	338
Hay Lake drainage basin	346
Bigstick Lake drainage basin	351
Many Island Lake drainage basin	362
Ross Creek drainage basin	369
Sevenpersons River drainage basin	379
Qu'Appelle River drainage basin	381
Moosejaw Creek drainage basin	384
Souris River drainage basin	389
Appendix, Report on Athabasca District by Gordon J. Smith, B.A., District Hydrographer	401
Index	407
Corrected Table on page 232 of 1912 Report inserted between pages	204 and 205

ILLUSTRATIONS

PLATE.	SUBJECT	
1.	Mount Ringrose near Laggan, Alberta	Frontispiece
		TO FACE PAGE
2.	Discharge, Mean Velocity and Area Curves of North Saskatchewan River at Prince Albert, Saskatchewan, for 1913	22
3.	Open Water Rating Curves for Spray River near Banff, Alberta	24
4.	Observations of Gauge Heights on Spray River near Banff, Alberta, with Corresponding Maximum and Minimum Temperature and the Estimated Daily Discharges for the Winter 1912-1913	26
5.	Cable station on Athabasca River at Jasper, Alberta	28
6.	Gauging station on Lobstick River near Entwhistle, Alberta	28
7.	Gauging Station on Sturgeon River near Fort Saskatchewan, Alberta	56
8.	Gauging Station on Battle River at Battleford, Saskatchewan	56
9.	Gauging Station on Bow River at Banff, Alberta, in Winter	82
10.	Gauging Station on Forty-mile Creek at Banff, Alberta, in Winter	82
11.	Gauging Station on the North Branch of Sheep River at Millarville, Alberta	114
12.	Gauging Station on the South Branch of Sheep River near Black Diamond, Alberta	114
13.	View of Pekisko Creek near Pekisko P.O., Alberta	124
14.	View of Willow Creek near Willows P.O., Alberta	124
15.	Crowsnest Mountain near Coleman, Alberta	178
16.	Source of Crowsnest River, a Branch of Oldman River, near Coleman, Alberta	178
17.	General View of the Current Meter Rating Station at Calgary, Alberta	218
18.	View of the Rating Car at the Current Meter Rating Station at Calgary, Alberta	218
19.	View in Valley of Fairwell Creek near East End, Saskatcheawn	294
20.	View of Frenchman River near Seventy-mile Crossing, Saskatchewan	294
21.	View of Upper Athabasca River Valley South of Jasper, Alberta	402
22.	View of Athabasca River above the Falls, South of Jasper, Alberta	402
23.	Jasper Lake (an Expansion of Athabasca River) and Miette Range of Mountains	404
24.	View of Upper Maligne River Valley	404
25.	Canyon on Maligne River	406
26.	Canyon on Rocky River	406
27.	View of Stony River Valley near its Junction with Athabasca River	406
28.	Headwaters of McLeod River (Mountain Park Pass)	406
29.	Big Bend in McLeod River near Edson, Alberta	406
30.	Grand Trunk Railway Bridge over McLead River at Mile 6 on Alberta Coal Branch	406
31.	Map Showing the Gauging Stations in Alberta and Saskatchewan	INSIDE BACK COVER.

To Field Marshal, His Royal Highness Prince Arthur William Patrick Albert, Duke of Connaught and of Strathearn, K.C., K.T., K.P., etc., etc., etc., Governor General and Commander in Chief of the Dominion of Canada.

MAY IT PLEASE YOUR ROYAL HIGHNESS:

The undersigned has the honour to lay before Your Royal Highness the report of the Progress of Stream Measurements for the year 1913.

Respectfully submitted,

(Signed) W. J. ROCHE,
Minister of the Interior,

OTTAWA, July 27, 1914.

DEPARTMENT OF THE INTERIOR,

OTTAWA, July 27, 1914.

The Honourable W. J. Roche, M.D.,
Minister of the Interior.

SIR:—

I have the honour to submit the report of Stream Measurements for the year 1913, and to recommend that it be published as the fifth of a series of progress reports.

I have the honour to be, Sir,
Your obedient servant,

W. W. CORY,
Deputy Minister of the Interior.

DEPARTMENT OF THE INTERIOR,
Irrigation Branch.

OTTAWA, July 27, 1914.

W. W. CORY, Esq., C.M.G.,
Deputy Minister of the Interior.

SIR:—

I submit herewith the report of Stream Measurements for the year 1913, submitted by F. H. Peters C. E., Commissioner of Irrigation, and would recommend that it be published.

Respectfully submitted,

E. F. Drake,
Superintendent of Irrigation.

DEPARTMENT OF THE INTERIOR,
IRRIGATION OFFICE,
CALGARY, ALBERTA., June 30, 1914.

E. F. DRAKE, ESQ.,
Superintendent of Irrigation,
Department of the Interior,
Ottawa, Canada.

SIR:—

I have the honour to transmit herewith the manuscript of the Report of the Progress of Stream Measurements for the calendar year 1913. This report has been prepared, under my direction, by P. M. Sauder, M. Can. Sec. C. E., Chief Hydrographer, G. H. Whyte, and G. R. Elliott, B. A. Sc.

I beg to recommend that it be published as the fifth of the series of Reports of Progress of Stream Measurements.

I have the honour to be, Sir,
Your obedient servant,
F. H. PETERS,

Commissioner of Irrigation.

DEPARTMENT OF THE INTERIOR,
IRRIGATION OFFICE,

CALGARY, ALBERTA, JUNE 29, 1914

F. H. PETERS, ESQ., M. CAN. SOC. C. E.,
Commissioner of Irrigation,
Department of the Interior,
Calgary Alberta.

SIR:—

I beg to submit herewith the manuscript of the Report of Progress of Stream Measurements for the calendar year 1913.

Owing to the fact that much of my time has been taken by other duties, most of the work of preparing this report has fallen to my assistants, G. H. Whyte, and G. R. Elliott, B.A. Sc. The report gives a brief outline of the methods of obtaining and compiling the data contained therein, but owing to the want of space and time, many of the details had to be omitted. There is given in tabulated form all the records of stream flow during 1913.

I beg to recommend that this report be published as the fifth of the series of Reports of Progress of Stream Measurements.

I have the honour to be, Sir,
Your obedient servant,

P. M. SAUDER,
Chief Hydrographer.

REPORT

OF

PROGRESS OF STREAM MEASUREMENTS FOR THE CALENDAR YEAR 1913.

By P. M. SAUDER, G. H. WHYTE and G. R. ELLIOTT.

INTRODUCTION

SCOPE OF WORK

The chief features of the stream measurement work are the collection of data relating to the flow of surface waters and a study of the conditions affecting this flow. Information is also collected concerning river profiles, the duration and magnitude of floods, irrigation, water-power, storage, seepage, etc., which may be of use in hydrographic studies.

This information is obtained by a series of observation at regular gauging stations which are established at suitable points. The selection of sites for these gauging stations and their maintenance depend largely upon the physical features and needs of the locality. If water is to be used for irrigation purposes the summer flow receives special attention; where it is required for power purposes it becomes necessary to determine the minimum flow; if water is to be stored, information is obtained regarding the maximum flow. In all cases the duration of the different stages of the streams is recorded. Throughout the country gauging stations are maintained for general statistical purposes, to show the conditions existing through long periods. They are also used as primary stations, and their records in connection with short series of measurements will serve as basis for estimating the flow at other points in the drainage basin.

During the open water season of 1913, records were taken at one hundred and forty-six (146) regular gauging stations on various streams in Alberta and Saskatchewan and at seventeen (17) regular gauging stations on irrigation ditches. Winter records, which are so valuable for power investigations and municipal water supplies, are receiving special attention and records are now being secured on almost all the important streams in these two provinces, during the entire year.

ORGANIZATION.

The methods of carrying on the investigations were similar to those of previous years. Local residents were engaged to observe the gauge height at regular stations. These observations were recorded in a book supplied by the department, and at the end of each week the observer copied the week's records on a postal card which was sent to the chief hydrographer by the first convenient mail. The district hydrographers made regular visits to the gauging stations, usually once in every three weeks. On these visits they examined the observers' records, made discharge measurements and collected such information and data as would be of use in making estimates of the daily flow at the station. The results of the guagings were transmitted by a postal card to the chief hydrographer. In the office these reports of the gauge height observers and the hydrographers were copied from the postal cards to regular forms and filed. At the close of the open season, some of the hydrographers returned to the office and assisted in the final computations and estimates of run-off. Gauge height-area, gauge height-mean velocity, and gauge height-discharge curves were plotted and rating tables constructed. Tables of discharge measurements, daily gauge height and discharge, and monthly discharge were also compiled. These records have been re-copied and are embodied in this, the Fifth Annual Report of Progress of Stream Measurements.

The organization also was very similar to that of previous years, except that owing to the fact that the Chief Hydrographer spent the most of his time on administrative work, and the office work had very materially increased, it was found necessary to increase the office staff to include two assistant engineers. The regular staff for the past year, therefore, included thirteen assistant engineers, a recorder, a computer, and a clerk. Similarly to previous years, the territory, which includes almost all the accessible portions of Alberta and Saskatchewan, was divided, for administrative purposes, into ten districts, viz.; Banff, Calgary, Macleod, Cardston, Milk River, Western Cypress Hills, Eastern Cypress Hills, Saskatoon,

Edmonton and Athabasca. In each district there was one hydrographer, who while in the field, employed temporary assistance, and was equipped with the necessary gauging and surveying instruments. In Banff, Calgary, Macleod, Saskatoon, Edmonton, and Athabasca districts, the hydrographers travelled by train and hired livery, and stopped at hotels and stopping houses; while in the other districts they were supplied with a team, light waggon, and light camping outfit. The thirteenth engineer was employed at rating meters and other extra work.

The number of gauging stations maintained during the winter months was much less than during the summer, and by re-arranging the district six engineers were able to do all the field work during the winter. The other seven engineers together with an extra temporary employee have compiled the records for the annua report. At the request of the Water Powers Branch, and the City of Prince Albert, a special study of the winter flow of the North Saskatchewan River at Prince Albert, was commenced in December last, and an extra assistant engineer was employed for this work.

BANFF DISTRICT.

This district included the following regular gauging stations:

Stream	Location	Date established
Bath Creek	N.E. 32-28-16-5	April 9, 1913
Bow River	S.E. 28-28-16-5a	July 18, 1910
Bow River	S.E. 35-25-12-5	May 25, 1909
Bow River	N.W. 32-24-8-5	Mar. 10, 1912
Cascade River	S.E. 19-26-11-5	August 16, 1911
Forty-mile Creek	S.W. 2-26-12-5	July 31, 1912
Ghost River	N.E. 23-26-6-5	Aug. 17, 1911
Jumpingpound Creek	S.E. 30-24-4-5	May 7, 1908
Kananaskis River	S.W. 34-24-8-5b	Aug. 31, 1911
Louise Creek	N.E. 20-28-16-5	July 5, 1913
Pipestone River	S.W. 27-28-16-5	Aug. 31, 1911
Spray River	N.W. 25-25-12-5	July 15, 1910

In a few cases the conditions have been so unfavourable that gauge readings could not be obtained all winter, but in almost every case discharge measurements have been made regularly at intervals of about two weeks during the whole year at all the above stations excepting those on Bath and Louise Creeks, which were established during the current year, and Jumpingpound Creek which was not maintained during the winter months.

Miscellaneous gaugings were made of Beaupre Creek (N.E. 15-26-5-5), Big Hill Creek (S.W. 10-26-4-5), Bow River (S.W. 32-26-14-5), Grand Valley Creek (S.W. 24-26-5-5), Healy Creek (S.W 29-25-12-5). Horse Creek (N.E. 8-26-4-5), Spencer Creek (S.E. 18--26 5-5), Spray River (at Spray Lakes) and Vermillion Creek (S.W. 32-26-14-5.)

The records at the two new gauging stations on Bath and Louise Creeks will give some valuable data regarding the run-off from the snow clad regions, as a large portion of the drainage areas above these stations is always covered with snow and ice.

The Calgary Power and Transmission Company have recently completed their new power plant at Kananaskis Falls, and now have a total capacity of 41,000 horsepower (25,000 at the Horseshoe plant and 18,000 at the Kananaskis plant), when there is sufficient water available. The operation of the storage reservoirs in connection with these plants affects the natural flow slightly of Bow River below Cascades River, and backwater from the dam at Kananaskis Falls made it necessary to move the gauging station on Kananaskis River further upstream.

Surveys by the Water Powers Branch indicate that the most favourable undeveloped storage on the head-waters of Bow River is at Spray Lakes and for the purposes of making a comparison of the flow of Spray River at the lakes and at the mouth, a gauging was made at the outlet of the lakes. The one isolated gauging does not, however, give very valuable information and as soon as possible a gauge will he established and gaugings made regularly.

H. C. Ritchie, A. M. Can. Soc. C. E., was in charge of the field work in this district and the final computations were made by G. R. Elliott.

---

a.—This station was originally located on N.E. 23-23-16-5 but was moved to its present position on August 31, 1911.

b.—This station was originally located on N.W. 33-24-8-5 but was moved to its present position on May 13, 1913.

CALGARY DISTRICT.

This district included the following regular gauging stations:

Stream	Location	Date established
Bow River	S.E. 2-21-19-4a	Aug. 20, 1909
Bow River	N.E. 32-21-25-4b	Sept., 1909
Boxelder Creek	N.E. 2-12-30-3	May 24, 1910
Bullshead Creek	S.E. 16-12-5-4	July 26, 1909
Findlay & McDougal Ditch	S.W. 31-18-29-4	June 17, 1911
Fish Creek	S.W. 26-22-3-5	May 13, 1907
Highwood River	S.E. 20-18-2-5	July 27, 1912
Highwood River	N.W. 6-19-28-4	May 28, 1908
Highwood River	N.W. 17-20-28-4	Oct. 3, 1911
Little Bow Ditch	S.W. 6-19-28-4	Aug. 1, 1910
Mackay Creek	N.W. 26-11-1-4	July 29, 1909
Pekisko Creek	N.W. 8-17-2-5	Oct. 6, 1911
Ross Creek	N.W. 31-11-2-4	July 28, 1909
Sevenpersons River	N.E. 30-12-5-4-	April 27, 1910
Sheep River	N.W. 22-20-29-4	May 25, 1908
N.B. Sheep River	S.W. 12-21-3-5	May 22, 1908
S.B. Sheep River	S.W. 17-20-2-5	May 23, 1908
South Saskatchewan River	N.W. 31-12-5-4	May 31, 1911
Stimson Creek	N.W. 2-17-2-5c	Oct. 6, 1911

It will be noted that this district did not include the Bow and Elbow Rivers at Calgary, but included instead several streams at, and east of Medicine Hat. Owing to the difficulty and cost of securing records on Berry and Blood Indian Creeks, the regular gauging stations on these two streams have been abandoned until the district is more accessible, and no gaugings were made of these at all during 1913. The lower station on Bow River had to be moved because of backwater from the Canadian Pacific Railway Company's dam. It is now located below the dam. The other gauging station in this district on Bow River was not satisfactory in its original location and had not been used for over two years. The Southern Alberta Land Company re-established it in its present position and we are co-operating with them in collecting the records.

Miscellaneous gaugings were made of the North and South Branches of Fish Creek near Priddis, Lineham's spillway at High River, Pine Creek near De Winton, Tongueflag Creek near High River and several springs.

The Dams of the Southern Alberta Land Company near Namaka and the Canadian Pacific Railway Company near Bassano are now practically completed and some water will probably be diverted at each of these points during 1914. Arrangements are therefore being made for securing records of the flow in the canals during 1914.

The only gauging stations in the above list that were maintained during the winter were those on Highwood River at High River and the South Saskatchewan River at Medicine Hat, the former being included in the Edmonton and the latter in the Macleod district during the winter months.

F. R. Steinberger, B.E., was in charge of the field work in this district during the open water period, and the final computations were made by G. R. Elliott and E. J. Switzer.

MACLEOD DISTRICT.

This district included the following regular gauging stations:

Stream	Location	Date Established
Belly River	N.W. 1-9-22-4	Aug. 31, 1911
Canyon Creek	N.E. 14-6-2-5-	July 6, 1910
Cow Creek	N.E. 14-8-2-5	May 26, 1910
Crowsnest River	S.W. 12-8-5-5	July 28, 1910
Crowsnest River	N.E. 36-7-4-5	July 28, 1910
Crowsnest River	N.E. 26-7-2-5	Sept. 7, 1907
McGillivray Creek	S.E. 7-8-4-5	July 23, 1913
Mill Creek	S.W. 18-6-1-5	July 7, 1910
Mosquito Creek	N.E. 30-16-28-4	Aug. 1, 1908
Muddypound Creek	S.W. 27-11-28-4	July 27, 1908

a.—This station was originally located on Sec. 13-21-19-4, but was moved to its present position in May, 1913.
b.—This station was originally located on Sec. 31-21-25-4, but was moved to its present position in May, 1913
c.—This station was originally located on the S.E. 14-17-2-5, but was moved to its present position on July 4, 1912.

Stream	Location	Date Established
Nanton Creek	S.E. 19-16-28-4a	Aug. 3, 1908
Oldman River	N.E. 34-7-1-5	Sept. 15, 1908
Oldman River	N.W. 10-9-26-4	July 12, 1910
Pincher Creek	S.W. 23-6-30-4	Aug. 13, 1906
Southfork River	S.W. 2-7-1-5	Aug. 5, 1909
St. Mary River	N.E. 26-7-22-4	Oct. 13, 1911
Todd Creek	S.W. 19-8-1-5	Aug. 3, 1909
Trout Creek	S.E. 33-11-28-4	July 7, 1911
Willow Creek	S.E. 26-9-26-4	July 1, 1909

Miscellaneous gaugings were made of Allison Creek (S.W. 11-8-5-5), Bellevue Creek (N.E. 29-7-3-5), Connelly Creek (S.E. 36-7-2-5), Dago Creek (S.W. 19-13-2-5), Drum Creek (.NE.. 18-7-3-5), Ernest Creek (N.E. 26-10-3-5), Fortier Springs (S.E. 17-7-1-5), Gold Creek (S.E. 30-7-3-5), Jim Creek (N.E. 6-15-1-5), Lyon Creek (Near Blairmore), Nez-Perce' Creek (S.E. 17-8-4-5), Playle Creek (S.W. 32-11-1-5), Summit Creek (S.W. 12-8-6-5), Willow Creek (near Claresholm), York Creek (N.W. 34-7-4-5) and several other spring creeks.

As this district has been organized for several years and there have been no extensive developments of the water resources, no changes of any account were made during the past year. Records of the flow of Oldman River have however become very valuable in connection with the investigation of the proposed scheme to irrigate a large tract of land lying between Little Bow River and Oldman River.

Winter records were taken of Belly River, Crowsnest River (three stations), McGillivray Creek (December only,), Oldman River (two stations), Southfork River, St. Mary River and Summit Creek (miscellaneous); Belly and St. Mary Rivers being included in the Cardston district during the winter months.

H. O. Brown, B. A. Sc. was in charge of the field work in this district until early in May when he was transferred to other work and Roundell Palmer was placed in charge for the balance of the year. The final computations were made by H. O. Brown, E. J. Switzer and G. R. Elliott.

CARDSTON DISTRICT.

This district included the following regular gauging stations:

Stream	Location	Date Established
Belly River	N.E. 5-2-28-4	Nov. 1, 1911
Belly River	S.E. 21-6-25-4	May 27, 1919
Boundary Creek	N.W. 20-1-26-4	June 18, 1913
Can. Pac. Ry. Co. Canal	S.E. 21-2-24-4	July 26, 1910
Christianson Ditch	S.E. 12-3-28-4	Sept. 14, 1911
Crooked Creek	S.W. 22-2-29-4	Sept. 15, 1909
Fidler Ditch	S.E. 19-1-26-4	Sept. 13, 1911
Lee Creek	N.W. 10-3-25-4	June 28, 1909
Lee Creek	S.E. 27-2-26-4	May 5, 1913
Mami Creek	S.E. 19-2-27-4	Aug. 13, 1909
N.B. Milk River	N.E. 11-1-23-4b	July 21, 1909
N.B. Milk River	N.E. 18-2-20-4	July 17, 1909
N. B. Milk River	S.W. 29-37 N-9 W.P.M. Montana, U. S. A.	Apr. 23, 1913
Rolph Creek	S.E. 21-2-24-4	May 17, 1911
St. Mary River	N.W. 25-1-25-4-	By A.R. I.Co In 1905
Waterton River	N.E. 8-2-29-4	Aug. 26, 1908

In 1912 an arrangement was made with the United States Geological Survey by which regular gauging stations on St. Mary and Milk Rivers would be maintained jointly, each bearing half the cost of construction and maintenance. The upper stations on St. Mary River and the North Branch of Milk River were therefore re-located at better sites and a new station was established on the South Branch of Milk River in the State of Montana. These stations were equipped with automatic recording gauges early in 1913, which have been used since then.

Miscellaneous gaugings were made of Blackfoot Creek (near Standoff), Blakiston Brook (N.E. 30-1-29-4), Boundary Creek (N.E. 27-1-26-4), Cottonwood Creek (S.W. 21-2-29-4), Drywood River (N.W. 18-4-29-4), Foothill Creek (near Twin Butte P. O.), Oil Creek (S.W. 23-1-30-4), Pine Creek (N.W. 21-3-29-4), and St. Mary River (S.W. 11-3-25-4).

---

a.—This station was originally located on N.W. 20-16-23-4, but was moved to its present location Sept. 1913.
b.—This station was originally located on N.E. 13-1-23-4, but was moved to its present position on May 1, 1913.

Winter records were taken of Belly River., Lee Creek, North Branch of Milk River, St. Mary River, and Waterton River; The station on Belly River at Standoff being included in the Macleod district during the winter months.

V. Meek, B. Sc., was in charge of the field work in this district from January 1st to January 26th, G. F. Deas from January 27th to April 29th, F. R. Burfield, A.M.I.C.E., from April 30th to September 13th, L. Danielson from September 15th to November 17th, and J. E. Degnan for the balance of the year. The final computations for the annual report were made by L. Danielsen, E. J. Switzer and G. H. Whyte.

MILK RIVER DISTRICT.

This district included the following regular gauging stations:

Stream	Location	Date Established
Deer Creek Cattle Co's Ditch	S.W. 36-1-12-4	April 27, 1912
Hooper and Huckvale's Ditch	S.W. 27-4-6-4	May 2, 1912
Manyberries Creek	S.W. 27-4-6-4a	June 17, 1910
Milk River	N.E. 21-2-16-4	May 18, 1909
Milk River	S.W. 35-1-13-4	Aug. 2, 1909
Milk River	S.W. 21-2-8-4	Aug. 5, 1909
Milk River	N.E. 6-37 N-9 E.P.M., Montana, U. S. A.b	Aug. 7, 1909
N.B. Milk River	S.W. 19-2-18-4	July 15, 1909
S.B. Milk River	N.W. 31-1-18-4	July 14, 1909

It was impossible to secure an observer for the gauge on the North Branch of Milk River on the S.W. ¼ Sec. 19, Tp. 2, Rge. 18, W. 4th Mer., but discharge measurements were made at every opportunity.

The gauging station in the State of Montana is maintained jointly with the United States Geological Survey. It was equipped with an automatic gauge early in the summer of 1913.

Miscellaneous gaugings were made of Bearguleh Creek (Sec. 19-2-9-4), Canal Creek (Sec. 6-4-6-4), Deadhorse Coulee (Sec. 4-2-11-4), Deer Creek (N.E. 26, S.W. 36 and S.W. 15-1-12-4), Halfbreed Creek (Sec. 28-2-10-4), Kennedy Creek (Sec. 3-1-5-4), Ketchum Creek (Sec. 16-4-6-4), Mackie Creek (Sec. 19-2-18-4), Miners Coulee (Sec. 11-2-11-4), and Police Coulee (Sec. 35-1-13-4).

Winter records were taken only at the regular gauging station on Milk River on the N.E. ¼ Sec. 21, Tp. 2, Rge. 16, W. 4th Mer., which was included in the Cardston district during the winter months.

J. E. Degnan was in charge of the field work in this district, and R. J. Srigley made the final computations for the annual report.

WESTERN CYPRESS HILLS.

This district included the following regular gauging stations:

Stream	Location	Date Established
Battle Creek	N.E. 33-5-29-3	June 3, 1909
Battle Creek	N.W. 33-5-27-3c	July 5, 1910
Battle Creek	N.E. 3-3-27-3	May 11, 1910
Bullshead Creek	N.W. 15-9-5-4	Oct. 9, 1911
Cheeseman Ditch	S.W. 12-8-29-3	June 24, 1911
Gaff Ditch	S.W. 25-5-29-3	July 11, 1911
Gap Creek	S.E. 4-10-27-3	April 25, 1909
Gap Creek	N.E. 31-11-26-3	May 3, 1910
Grosventre Creek	S.E. 27-9-4-4	Oct. 10, 1911
Lindner Ditch	N.W. 10-6-29-3	July 26, 1910
Lodge Creek	N.W. 10-6-3-4	July 22, 1909
Lodge Creek	N.E. 36-3-1-4	Aug. 31, 1912
Lodge Creek	S.E. 12-1-29-3	Aug. 13, 1909
E.B. Lodge Creek	S.E. 1-7-3-4	Oct. 17, 1911
E.B. Mackay Creek	N.W. 36-10-1-4	Oct. 13, 1911
W.B. Mackay Creek	N.E. 27-10-1-4d	Oct 12, 1911
Maple Creek	N.E. 16-11-26-3	May 9, 1908

a.—This station was originally located on S.E. 3-5-6-4, but was moved to its present position on May 2, 1912.
b.—This station was originally located on S.E. 3-1-5-4, but was moved to its present position in the spring of 1913
c.—This station was originally located on the S.W. 2-6-28-3, but was moved to its present position on May 29, 1912.
d.—This station was originally located on the S.W. 23-10-2-4, but was moved to its present position on September 20, 1912.

Stream	Location	Date Established
Maple Creek	S.E. 28-11-26-3	May 4, 1910
McShane Creek	S.W. 3-10-27-3	April 23, 1909
Middle Creek	S.W. 35-5-1-4	June 21, 1910
Middle Creek	S.W. 30-5-29-3	July 20, 1909
Middle Creek	N.W. 4-2-29-3	June 13, 1910
Oxarart Creek	N.E 20-6-27-3	June 15, 1909
Ross Creek	N.W. 24-9-3-4	Oct. 11, 1911
Sixmile Creek	S.W. 6-7-28-3a	July 22, 1909
Spangler Ditch	S.W. 6-7-28-3	July 10, 1911
Stirling and Nash Ditch	S.E. 22-3-27-3	July 11, 1911
Tenmile Creek	S.E. 4-6-29-3	July 21, 1909
White Ditch	S.W. 1-9-27-3	June 15, 1911
Sage Creek	N.E. 9-1-2-4	Aug. 10, 1909

Miscellaneous gaugings were made of Anderson Ditch (S.W. 23-6-3-4), Cypress Creek (S.W. 17-9-27-3), Fourmile Creek (S.E. 11-8-29-3), Maple Creek (N.W. 23-14-26-3), Marshall and Gaff Ditch (N.E. 33-5-29-3), Middle Creek, Mink Creek (S.E. 31-7-29-3), Mitchell Ditch (N.E. 23-14-26-3) Starks and Burton Ditch (S.E. 17-11-5-4), Stoney Creek (N.E. 30-11-1-4), Whitemud Coulee (S.W. 26-7-29-3) and several spring and small creeks.

The station on Lodge Creek near the International boundary was equipped with a cable, car, measuring line and stay line. Gaugings can now be made at all stages of the stream.

During the year several private irrigation ditches were completed and the area in this district under irrigation is being gradually increased. An extensive survey for the purpose of locating reservoir sites and determining the irrigable areas under them was made under the direction of the Commissioner of Irrigation during 1913. The results of the Survey which are of considerable interest will be found in his report on "Irrigation and Irrigation Surveys" for 1913.

During 1913, a part of the Weyburn-Lethbridge Branch of the Canadian Pacific Railway was graded through this district. It will soon be completed and in operation, which will make this district much more accessible and give its development quite an impetus.

No winter records were taken in this district during 1913.

H. D. St. A. Smith, Grad. R.M.C., was in charge of the field work in this district during 1913, and also made the final computations for the annual report.

EASTERN CYPRESS HILLS.

This district included the following regular gauging stations:

Stream	Location	Date Established
Bear Creek	S.E. 18-11-23-3	June 22, 1908
E.B. Bear Creek	S.E. 21-10-23-3	Aug. 18, 1909
W.B. Bear Creek	S.W. 32-10-23-3	Sept. 16, 1909
Belanger Creek	S.W. 18-7-25-3	June 12, 1909
Belanger Creek	S.W. 30-6-25-3	Mar. 31, 1912
Bone Creek	N.W. 34-8-22-3	July 2, 1908
Bridge Creek	S.E. 33-10-22-3	April 8, 1911
Bridge Creek	N.E. 11-11-22-3	July 29. 1909
Davis Creek	N.E. 29-6-25-3	May 24, 1909
Fairwell Creek	N.W. 30-6-24-3	June 10, 1909
Frenchman River	N.W. 16-6-24-3	July 10, 1912
Frenchman River	N.E. 23-6-23-3	July 9, 1912
Frenchman River	N.E. 31-6-21-3	July 31, 1908
N.B. Frenchman River	N.E. 16-7-22-3	July 25, 1908
Hay Creek	S W 29-10-25-3	July 4, 1910
Hay Creek	N.E. 30-10-25-3	April 22, 1909
Jones Creek	S.E. 20-8-20-3	May 15. 1912
Lonepine Creek	N.W. 27-7-26-4	July 17, 1909
Morrison Ditch	S.W. 26-6-21-3	Aug. 22, 1911
Piapot Creek	N.E. 18-11-24-3b	June 17, 1908
Pollock Ditch	N.W. 22-7-21-3	Aug. 10, 1911
Rose Creek	N.E. 26-7-22-3	May 1, 1911
Skull Creek	N.E. 29-10-22-3	April 8, 1911
Skull Creek	N.W. 10-11-22-3	June 29, 1908

a.—This station was originally located on the N.W. 29-7-28-3, but was moved to its present position on July 4, 1911.

b.—This station was originally located on the S.W. 17-11-24-3, but was moved to its present position on May 13, 1909.

Stream	Location	Date Established
Strong and Day's Ditch	N.E. 25-6-22-3a	July 31, 1908
Sucker Creek	N.W. 24-6-26-3	May 26, 1909
Swiftcurrent Creek	S.W. 22-7-21-3	May 18, 1909
Swiftcurrent Creek	S.E. 18-10-19-3	June 15, 1910
Swiftcurrent Creek	S.W. 17-10-19-3	May 27, 1910

Miscellaneous gaugings were made of Barroby Ditch (S.E. 33-6-23-3), Bates Ditch (S.E. 7-6-16-3), E.B. Bear Creek (N.E. 29-10-23-3), W.B. Bear Creek (N.E. 29-10-23-3), Blacktail Creek (N.E. 30-6-23-3), Bone Creek (N.E. 10-11-20-3). Calf Creek (Sec. 4-8-22-3), Concrete Coulee (Sec. 2-7-21-3), Cross Ditch N.W. 15-7-22-3), Doyle Coulee (S.E. 17-7-22-3), Dry Coulee (N W. 16-6-24-3), Frenchman River (Sec. 21-5-17-3), Jones Coulee (N.E. 5 & S.W. 8-8-20-3), Mule Creek (S.E. 34-5-17-3), Petrified Coulee (N.E. 7-4-27-3), Rocky Creek (S.E. 6-8-27-3, Saunders Springs (S.E .20-10-25-3), and several other springs and small creeks.

Artificial controls were constructed on Skull and Piapot Creeks and proved very satisfactory, and on two very small streams,Rose and Lonepine Creeks, weirs were constructed and also proved very satisfactory. The beds of these streams had always been very unstable and made it difficult to make accurate estimates of the daily discharge. It is proposed to construct weirs or artificial controls at several other stations which have been shifting.

During the year several private irrigation ditches were completed and the area in this district under irrigation is also being gradually increased.

The Weyburn-Lethbridge Branch of the Canadian Pacific Railway is graded through this district and will soon be completed and in operation. This will very materially assist in the development of the district.

No winter records were taken in this district during 1913.

E. W. W. Hughes was in charge of the field work in this district and also made the final computations for the annual report.

SASKATOON DISTRICT.

This district included the following regular gauging stations:—

Stream	Location	Date Established
Battle River	S.E. 19-43-16-3	June 17, 1911
Bridge Creek	S.E. 23-13-19-3	Mar. 29, 1911
Long Creek	S.E. 10-2-8-2	June 22, 1911
Moose Mountain Creek	N.E. 15-3-2-2	Sept. 4, 1913
Moosejaw Creek	N.E. 24-11-19-2	June 21, 1911
do	N.W. 16-16-26-2	April 7, 1910
Qu'Appelle River	N.W. 33-19-21-2	May 12, 1911
North Saskatchewan River	N.E. 29-43-16-3	May 16, 1911
South Saskatchewan River	(River Lot No. 76) Prince Albert	Oct. 2, 1911
do	S.W. 28-36-5-3	May 27, 1911
Souris River	N.E. 11-2-8-2	June 23, 1911
do	N.E. 36-2-1-2	June 26, 1911
do	S.W. 6-4-26-1	July 20, 1911
Swiftcurrent Creek	S.W. 30-15-13-3	April 30, 1910
do	N.W. 18-15-13-3	May 5, 1913

Miscellaneous gaugings were made of Moosejaw Creek (N. E. 14-15-25-2), Morrison Creek (N.W. 7-8-2-2), Souris River (S.W. 15-2-8-2), Swiftcurrent Creek (S.W. 12 & S.E. 24-15-14-3, and S.W. 19-15-13-3), and Thunder Creek (at Moose Jaw).

During 1913, the City of Swift Current built a dam in Swiftcurrent Creek to store water for domestic purposes during the winter when the flow in the creek is very small and insufficient, and the City of Moose Jaw completed a dam in Moosejaw Creek to store water for fire protection purposes.

As intimated elsewhere, a special study of the winter flow of the North Saskatchewan River at Prince Albert was commenced in December and an extra assistant engineer was engaged for the work. Three careful gaugings were made each week and the gauge was read three times each day. This will not only give very accurate records of the discharge of the river but the results should also furnish some valuable data for research purposes.

Winter records were taken at all of the regular gaugings stations in this district, except on Bridge Creek, Long Creek, Moose Mountain Creek, the upper station on Moosejaw Creek and the two lower stations on Souris River.

O. H. Hoover, B.A.Sc., was in charge of the field work in this district and also made the final computations for the annual report. W. H. Storey was placed in charge of the special work at Prince Albert.

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a.—This station was originally located on Sec. 36-6-22-3, but was moved to its present position on April 17, 1911.

EDMONTON DISTRICT.

This district included the following regular gauging stations:—

Stream	Location	Date Established
Athabasca River	S.E. 20-66-22-4	Feb. 23, 1913
Battle River	S.W. 4-43-25-4	May 7, 1913
Bow River	N.E. 15-24-1-5	Nov. 25, 1910
Can. Pac. Ry. Co's Canal	N.E. 21-23-29-4a	May 18, 1911
Elbow River	S.W. 14-24-1-5b	May 8, 1908
Nose Creek	N.W. 13-24-1-5	April 24, 1911
North Saskatchewan River	N.E. 21-39-7-5	June 2, 1913
do do	N.W. 33-52-24-4	May 14, 1911
Red Deer River	S.E. 20-38-27-4	Dec. 2, 1911
Sturgeon River	Bet. River Lots 27 & 52 St. Albert Settlement.	April 23, 1913
do	N.W. 28-55-22-4	Dec. 30, 1913

There was no apparatus at the gauging station on Athabasca River for making gaugings during open water and discharge measurements were therefore made only during the winter months. A cable has however since been installed and continuous records will be secured in future.

The new gauging station on the North Saskatchewan River is at Rocky Mountain House, and owing to the poor train service very few gaugings were made. A gauging station was also started on the Clearwater River, at the same place, but was not finished for use in 1913.

A Gurley Self Recording Water Stage Register was installed at the gauging station on Bow River in November, 1913.

Miscellaneous gaugings were made of Blindman River (N.W. 15-39-27-4), Pigeon Creek (at outlet of Pigeon Lake), and Red Deer River (N.E. 6-36-28-4).

Winter records were taken at all of the regular gauging stations in this district, except those on Battle River, Can. Pac. Ry. Co's Canal, and Nose Creek.

While there has been very little water power developed in this district, several concerns have made plans and will probably commence construction in the near future.

F. R. Burfield, A.M.I.C.E., was in charge of the field work in this district from January 1st to February 7th, V. Meek, B.Sc., from February 8th to May 12th, J. S. Wright, Grad. R.M.C., from May 13th to June 19th, H. B. R. Thompson, from June 26th to July 14th, and P. H. Daniells, B.S., from July 15th to the end of the year. The final computations for the annual report were made by E. J. Switzer and G. H. Whyte.

ATHABASCA DISTRICT.

This district included the following regular gauging stations:—

Stream	Location	Date Established
Athabasca River	N.W. 15-45-1-6	Mar. 4, 1913
Lobstick River	N.E. 30-53-7-5	July 11, 1913
Miette River	S.W. 9-45-1-6	Aug. 23, 1913
Rocky River	N.W. 13-48-28-5	July 3, 1913

Miscellaneous gaugings were made of Athabasca River (N.E. 5-51-25-5 and S.E. 20-66-22-4), Edson River (S.E. 16-54-16-5), Embarras River (S.W. 5-52-18-5), Fiddle Creek (near Miette Hot Springs), Macleod River (N.W. 3-54-16-5 and N.W. 5-52-18-5), Maligne River (near Jasper), Pembina River (S.W. 20-53-7-5), Prairie Creek (N.E. 5-51-25-5), Snaring River (N.W. 33-46-1-6), Sundance Creek (N.W. 4-53-18-5), Stoney River (near Jasper House) and Wolf Creek (S.W. 3-54-16-5).

This district ,it will be observed, is a new one, and was until June 1913, a part of the Edmonton district. Considerable reconnaissance was done, but because observers were not available only a few regular stations were established. Several more regular stations will however be established during 1914. There are quite a number of every good sites for developing water power and winter records are therefore of especial value and are receiving particular attention.

G. J. Smith, B.A., was in charge of the field work in this district during 1913 and has written a very interesting report of the district and the work done by him, which is attached to this report as an appendix. G. H. Whyte made the final computations for the annual report.

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a.—This station was originally located on N.E. 36-23-1-5-, but was moved to its present position in April, 1913.

b.—This station was originally located on the S.E. 15-24-1-5, but was moved to its present position in November 1911.

CURRENT METER RATING STATION.

The rating station was kept in operation from early in May until early in November. During this period all the current meters used in the field during 1913 were rated at least once and most of them were rated twice.

In all fifty-six current meters were rated, thirty-seven for this branch, eight for the Manitoba Hydrographic Survey, six for the British Columbia Hydrographic Survey, two for the British Columbia Dept. of Lands, two for the Canadian Pacific Railway Company and one for Anderson and Warden, Consulting Engineers, at Vancouver, B.C. Each meter was rated in the condition in which it was returned from the field, and again after being cleaned, adjusted and fitted with a new bearing. A rating table was prepared on tracing linen for each rating of each current meter. Blue prints of these were sent out with the meters and the originals were filled in the office for future reference.

The recording apparatus on the rating car was improved early in the season so that now the exact time and distance of the run for an exact number of revolutions of the meter can be recorded. This simplifies the work and the results are more accurate.

BENCH-MARKS.

When the stream measurement work was first started, the gauges were usually referred to bench marks on wooden stakes or stumps of trees. These were easily shifted or destroyed and were not satisfactory. In 1911, an iron bench-mark was adopted by this branch and now almost all the gauges are either referred to bench-marks on concrete piers or other permanent structures, or to one of these iron bench-marks. Whenever an opportunity is afforded these are tied to the Canadian Pacific Railway or Dominion Government levels, to determine their elevation above sea level, and they are therefore also a convenient reference for local levelling operations.

Description of the iron bench-marks are given in the Report of the Progress of Stream Measurements for 1911 and 1912.

OFFICE WORK.

As above intimated the reports of the gauge height observers and the hydrographers are transmitted to the office by postal cards. These are copied to office forms and filed in a cabinet, which is carefully indexed and where they can be referred to at any time without trouble. As the engineers complete their computations, the results are entered on convenient forms and filed in the same cabinet.

A cabinet made up of four styles of drawers is used for filing the records. The top section is used for filing the gauge height books of the observers and the current meter note books of the hydrographers. The gauge height books are filed alphabetically according to the names of the gauging stations while the current meter note books are filed alphabetically, according to the names of the hydrographers. The next section contains the postal cards sent in by the observers and the hydrographers. Both of these are filed alphabetically, according to the names of the gauging stations. The third section is made up of map drawers and contains the gauge height-area, gauge height-mean velocity and gauge height-discharge curves, and plotted cross-sections which are filed alphabetically, according to the names of the gauging stations. The same section contains the maps showing the outlines of the drainage basins, filed numerically according to the number of the sectional sheet. The rating curves for the current meters are also filed in this section numerically, according to the office numbers of the meters. The bottom section of the cabinet consists of letter size pockets, alphabetically arranged for each gauging station. The tables of gauge heights, discharge measurements, daily gauge height and discharge, monthly discharge, a description of the station, and memos of any changes are filed in these pockets. The different rating tables for each meter are also filed numerically in this section and another drawer contains the monthly reports of the meteorological service.

The copying and filing of the reports of the gauge height observers and the hydrographers is entrusted to the office recorder. While doing this he must carefully examine all records to see that there are no errors, and where there are doubtful or impossible records it is his duty to have the data corrected or ascertain the cause of the unusual condition. He also makes out the pay list for the observers and condutes the correspondence relating to the records.

All computations are checked before being used or published. For this reason, as far as possible, men with some technical education, or students in science, are engaged as helpers. The gaugings are computed by the helper and his work is checked by the hydrographer. In some instances where there is a great deal of driving and camping out, the hydrographer cannot secure a helper who can compute discharges, and in that case he computes the discharges himself and his computations are checked in the office.

Gaugings of the flow under ice are usually made by using the multiple point method, and vertical velocity curves have to be plotted to determine the mean velocity in the vertical.

The computation by this method is long and tedious and cannot be done by the hydrographer in the field. There are therefore a great many computations to be made in the office and the services of a computer are required.

During the year 1913, G. H. Nettleton filled the position of office recorder and J. B. Gray that of office computer.

When the stream measurement work was first started there was a slight tendency to make a big showing in the field work and to overlook the office work. Usually the district hydrographers are young and somewhat inexperienced engineers and do not always realize the importance of some of the details of the work. All the reports and field books should therefore be thoroughly checked as they are received and the results should be plotted on the gauge height-area, gauge height-mean velocity, and gauge height-discharge curves as soon as received in the office. Discrepancies in the records are then discovered at an early date, and the office is able to keep a better check on the results. and direct the work more intelligently. The Chief Hydrographer now spends the greater portion of his time on irrigation work and can only exercise a very general supervision over the stream measurement work. The staff was therefore strengthened early in 1913, by the appointment of two assistants to the Chief Hydrographer, who in addition to performing the duties of office engineers, act also as field inspectors. By constantly checking up the field and office work the assistants are bringing it up to a higher degree of accuracy.

G. H. Whyte was appointed First Assistant to the Chief Hydrographer on January 1st, 1913, and G. R. Elliott, B.A.Sc., was appointed Second Assistant to the Chief Hydrographer on April 1st, 1913.

CONVENTIONS AND CONFERENCES.

In August P. M. Sauder and G. H. Whyte attended a convention of the Western Canada Irrigation Association at Lethbridge, Alberta. As usual the convention was well attended and the papers and addresses were very interesting and instructive. At the close of the convention the delegates were shown over some irrigated farms in the vicinity of Lethbridge.

In January 1914, G. H. Whyte attended a conference of the Western District Engineers of the Water Resources Branch of the United States Geological Survey, as representative of this office. It was held in the district office of the survey in Boise, Idaho, and was attended by N. C. Grover, Chief Hydrographer of the U. S. Geological Survey, most of the District Engineers of the Water Resources Branch in the Western States, a number of Assistant Engineers, two representatives from the U. S. Reclamation Service, and three representatives from Canada. The other Canadian representatives were R. G. Swan, Chief Engineer, British Columbia Hydrographic Survey, Vancouver, B.C., and C. E. Richardson, District Engineer, British Columbia Hydrographic Survey, Nelson, B.C. While papers were not assigned to the Canadian representatives, they took part in the discussions and were given the same consideration as the District Engineers of the Water Resources Branch, and the conference was always glad to hear how the work is done in Canda. M. Whyte considers himself very fortunate in having had the opportunity to attend this conference, and recommends that representatives be sent to all such conferences that invitations are received for. His report of the conference was submitted some time ago, but as it deals more particularly with details of engineering and administrative work, it is not attached for publication.

On February 20th and 21st, advantage was taken of the fact that nearly all the engineers of this branch employed on stream measurement were in headquarters to hold a conference. All the hydrographers were able to attend but F. R. Steinberger and W. H. Storey. The papers were quite satisfactory and showed that the engineers are taking a keen interest in their work. Many important points were brought out in the papers and discussions.

It is hoped that another conference will be held next winter and that other branches of the government and other organizations doing stream measurement work will be invited to send representatives.

FUTURE WORK.

The appropriation for stream measurements for the fiscal year 1914-1915 is larger than that of previous years and the work is therefore being extended.

A special effort was made this year to get records of the early spring run-off in the Cypress Hills and Milk River districts. To do this two hydrograpers were sent out into each of these districts early in March. Owing to the fact that there was a comparatively small fall of snow during the past winter, the run-off was, it is believed, somewhat below the average but the records will nevertheless be quite valuable.

Records of the flow of Milk River and almost all its important tributaries have been taken near the international boundary for several years, but very few records have been taken of Frenchman River and its tributaries near where it crosses the international boundary, and a hydrographer has therefore been placed in the field to secure complete records of these and other streams crossing the international boundary east of Frenchman River during the present year.

Several additional regular gauging stations will be established in Northern Alberta at an early date, and as soon as they can be eached at a reasonable expense records will be taken on all the important streams in Northern Alberta.

In 1913, investigations of the absorption and seepage losses in canals were commenced on the canals of the Canadian Pacific Railway Company near Calgary and Lethbridge. This work will be continued and given special attention during 1914.

It is also proposed to maintain several additional regular gauging stations during the coming winter.

DEFINITIONS.

The volume of water flowing in a stream is known as run-off or discharge. In expressing it various units are used, depending upon the kind of work for which the data is needed. Those used in this report are "second-feet," "acre-feet," "run-off per square mile" and "run-off in depth in inches" and may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the body of water flowing in a stream one foot wide and one foot deep at the rate of one foot per second.

The "acre-foot" is the unit capacity used in connection with storage for irrigation work and is equivalent to 43,560 cubic feet. It is the quantity required to cover an acre to a depth of one foot.

The expression "second-feet per square mile" means the average number of cubic feet of water flowing each second from every square mile of drainage area on the assumption that the run-off is uniformly distributed.

"Depth in inches" means the depth of water in inches that would have covered the drainage area, uniformly distributed, if all the water could have accumulated on the surface. This quantity is used for comparing run-off with rain-fall, which quantity is usually given in depth in inches.

It should be noticed that "acre-feet" and "depth in inches" represent the actual quantities of water which are produced during the periods in question, while "second-feet," on the contrary, is merely a rate of flow per second.

EXPLANATION AND USE OF TABLES.

The data obtained and the estimates made therefrom have been compiled in tabulated form and for each regular gauging station are given, as far as available, the following data:—

1. Description of station.
2. List of discharge measurements.
3. Table of daily gauge heights and discharges
4. Table of monthly discharges and run-off.

The description of stations gives such general information about the locality and equipment as would enable the reader to find and use the station. It also gives, as far as possible complete history of all the changes that have occured since the station was established and that might affect the records in any way.

The list of discharge measurements gives the results of all the discharge measurements that have been made at or in the vicinity of the gauging station or have been used in completing the records for the gauging station. It gives the date on which the measurement was made, the name of the hydrographer, the width and area of cross-section, the mean velocity of the current, the gauge height and the discharge in second feet.

The table of daily gauge heights and discharges given in this report is a combination of two tables kept in the office of the survey, namely the table of daily gauge heights and the station rating table. The table of daily gauge heights gives the daily fluctuations of the surface of the water above the zero of the gauge, as reported by the observer. During high water, two observations of the gauge were made at some stations and the gauge height given in the table is the mean of the observation for the day. The discharge measurements and guage heights are the base data from which the other tables are computed. The table of daily discharges is the discharge in second-feet, corresponding to the stage of the stream, as given by the station rating table.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gauge height was highest. As the gauge is the mean for the day, there might have been short periods when the water and the corresponding discharge were greater than given in this column. Likewise, in the column "Minimum" the quantity given is the mean flow for the day when the mean gauge height was lowest. The column headed "Mean" is the average flow for each second during the month. The computations for the quantities in the remaining columns have been based upon this mean. The drainage area for each gauging station was marked off on the sectional maps of the Department and the area taken off with a planimeter. In many districts, information regarding topographical features is very incomplete and the computed areas are only approximate. As the surveys of the Department are extended and completed these computations will be checked and, if necessary, corrected.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:—

1 cubic foot equals 6.23 British Imperial gallons.
1 cubic foot equals 7.48 United States gallons.
1 acre equals 43,560 square feet; equals 4,840 square yards.
1 acre-foot equals 43,560 cubic feet.
1 acre-foot equals 271,472 British Imperial gallons.
1 acre-foot equals 325,850 United States gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0,0737 second-feet per year.
1 second-foot equals 6.23 British Imperial gallons per second; equals 373.8 gallons per minute; equals 538,272 gallons for one day.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55,54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
1 second-foot for 153 days equals 303.47 acre-feet.
1 second-foot for one year equals 724 acre-feet.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for 153 days covers 150 acres 24,278 inches or 2.023 feet deep.
1 second-foot for one year covers 1 square mile 13,572 inches or 1.131 feet deep
100 British Imperial gallons per minute equals 0.268 second-feet.
100 United States gallons per minute equals 0.223 second-feet.
1,000,000 British Imperial gallons per day equals 1.86 second-feet.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 British Imperial gallons equals 3.68 acre-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 foot per second equals 0.682 miles per hour.
1 cubic foot of water weights 62.5 pounds.
1 horse-power equals 550 foot-pounds per second.
1 horse-power equals 746 watts.
1 horse-power equals 1 second-foot falling 8.80 feet.
1⅓ horse power equals 1 kilowatt.

To calculate water power quickly: $\frac{\text{sec. ft. x fall in feet}}{11} =$ net horsepower on water wheel, realizing 80 per cent of the theoretical power.

To find the number of acre-feet required for a certain acreage under the prescribed duty of water of one hundred and fifty acres for each cubic foot of water per second flowing continuously during the irrigation season (153 days), multiply the acreage by 2.02314.

1 British Columbia miners' inch equals 1.68 cubic feet per minute or 1 second-foot approximately equals 35.7 British Columbia miners' inches.

METHODS OF MEASURING STREAM FLOW.

There are three distinct methods of determining the surface flow of streams: (1) by measurements of slope and cross-section and the use of Chezy's and Kutter's formulae; (2) by means of weirs, which include any device or structure that by measuring the depth on a crest or sill of known length and form, the flow of water may be determined; (3) by measuring the velocity of the current and the cross-section. The third method is the one most commonly used by this survey. The second is used when the flow is too small to be accurately determined by the third, while the first is only used in making estimates of the discharge of a stream when the only data available are the cross-section and slope.

Slope Method of Determining Discharge.—The slope of a stream, or rather of a section of a stream, is the difference in elevation between the upper and lower ends of the section, commonly called the fall, divided by the distance or the length of the section. Slope sections vary in length from two or three hundred feet to several hundred feet, depending largely upon the nature of the stream.

It is difficult to ascertain accurately the slope of the water surface in a stream, since in nearly all streams there are pulsations in the water, causing the surface to rise and fall locally. In most streams the slope of the bottom is far from uniform, and the flow of water in any given section is more or less influenced by the flow in the adjacent section, above or below. For this reason it is a good plan to consider a number of adjacent sections, comprising a considerable length of the stream in one computation, being careful to take into account the diversity of cross-section at various places in the length.

In determining the slope of the surface of a stream, levels are taken of the water surface at each end of the slope section, and referred to some datum or bench mark. A good plan is to set firmly a stout wooden stake below the water surface at each end of the slope section, and then to drive a nail into the top of each stake, so that the nail-head will exactly coincide with the water surface. The difference in elevation between the two nail-heads, divided by the distance between the stakes, will give the slope.

The wetted perimeter is that portion of a stream channel that is in contact with the water. The form or outline of the wetted perimeter of a stream has an important influence upon the velocity of the current. It is usually determined graphically from the plotted cross-section or may be measured by means of a flexible tape or chain after the flood has subsided.

The hydraulic radius, which is sometimes called the mean radius of the channel below the water surface is found by dividing the area of the cross-section (in sq. ft.) by the length of the wetted perimeter (in feet).

The Chezy formula, which is the fundamental formula for stream discharge, is:

$$Q = A\ V$$

in which Q = the discharge of the stream in sec. ft.

A = the area of the cross-section in sq. feet.

V = the mean velocity of flow, in ft. per sec.

In applying this formula to the determination of stream discharge, the mean velocity of a stream is considered a function of the slope and of the wetted perimeter of the stream. This may be expressed by formula as follows

$$V = C\sqrt{r\,s}$$

in which r = the hydraulic radius of the channel.

s = the surface slope.

and C is a variable coefficient, depending upon the nature of the channel.

In determining the value of C for any given case it is customary to make use of Kutter's formula, which is:—

$$C = \frac{41.6 + \frac{.00281}{s} + \frac{1.811}{n}}{1 + \left(41.6 + \frac{.00281}{s}\right)\frac{n}{\sqrt{r}}}$$

In this formula r and s have the same significance as in the Chezy formula and the new factor n is called the coefficient of roughness. It is a variable coefficient, and its value is dependent upon the size, shape, slope and degree of roughness of the channel. Tables of values of n are given in various text books, but it is difficult to choose the correct value. It is therefore advisable whenever possible to compute the value of n from a measured discharge. As the slope method of determining discharge is seldom employed except to estimate flood discharge, a current meter measurement is very often made at the slope section, during low water. Having determined the mean velocity, slope and hydraulic radius at the time of the metering, the value of C may be found from the formula $V = C\sqrt{rs}$ or $C = \frac{V}{\sqrt{rs}}$—Trautwine's Pocket Book for Civil Engineers and other texts contain tables giving the value of n for different values of r, s, and c. From these tables we can interpolate the proper value of n for a particular section of the stream, at low water stage. In most cases this value of n is applicable to high water and flood conditions of the stream also and is used with values of r and s for the high water or flood cross-section to determine the value of C at the higher stage. Having determined the value of C the computation of the discharge is simple.

The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value of n to be used.

Weir Method of Determining Discharge.—As yet few permanent weirs have been constructed by this survey, but many regular weir measurements are made on small streams by means of a temporary weir. The weir used consists of a wooden base of 2-inch plank, to which is bolted a rectangular notch of three-eights inch steel with bevelled edges.

In making a measurement by means of a temporary weir, the following directions should be followed as far as possible. The weir should be placed perpendicular and at right angles to the bed of the stream with the crest level. The discharge should be free in so much as the

nappe should have sufficient fall to allow air to have free circulation underneath it, and the head or depth on the crest should not exceed one-third of the length. The channel of approach should be several times as wide as the opening and the depth of water in the bay or pond should be at least twice the head on the weir, so as to eliminate velocity of approach and cross-currents. In choosing a site for a weir, a point should be chosen that will fulfil the above conditions and give a good sized bay or pond.

To set up a temporary weir, a dam of sods and earth is thrown across the stream, the weir is set in place and the sods are tramped firmly around it to stop all leakage. On a stream with a sandy bed, sods or clay must be placed on the bottom for a few feet upstream to form a mattress to prevent the undermining of the dam.

After the bay has filled up, the head of the water is observed by taking the difference in elevation of the crest of the weir and the elevation of the water surface in the bay at a distance of 4 to 10 feet from the weir, with an engineer's level. Two common methods of getting the elevation of the water surface are (1) hold the levelling rod on a stone or other solid body under water and subtract the depth of water on the rod from the sight on the rod; (2) drive a pin divided into tenths of feet into the bed of the stream so that an even tenth is level with the surface of the water, then hold the levelling rod on the top of the pin and add the length of pin above the water to the sight on the rod.

When the head of water has been determined the discharge, is computed by using one of the standard formulae which will suit the case. Tables giving the discharges for different heads and lengths of crests are published in many engineering texts.

The formula used by this survey for rectangular sharp-crested weirs is:

$Q = 3.33 \ (L - .2H) \ H^{3/2}$ being a modification of Francis' formula, to allow for end contractions and elimination of velocity of approach.

in which Q = discharge in sec. ft.; L = length of crest in feet; H = head in feet.

Measurements by means of temporary weirs should be made some distance above or below the gauge. If they are made close to a gauge, the gauge must be read before the weir is placed in the stream and the pond must be allowed to run off after the weir is removed before the gauge is re-read.

Velocity Method of Determining Discharge.—There are two methods of determining the velocity of flow of a stream, namely, direct and indirect. In the direct method by which the velocity is determined by means of floats, the liability of error is large, and the results far from satisfactory. This method is seldom used except for very rough estimates or when a current meter cannot be used. There are three common kinds of floats, viz: surface, sub-surface and tube or rod floats. In each the procedure is the same. A straight piece of channel is selected for the run and two cross-sections are taken at some convenient distance apart, usually from 100 to 200 feet. They are then divided into strips by means of a tagged wire. The velocity in each strip is then measured by noting the time taken by the float in traversing the run or distance between the two cross-sections. As the time and distance are both known the velocity can easily be computed. The velocity, whether measured by surface, subsurface or tube floats, must be multiplied by a coefficient less than unity to reduce to the mean velocity before being used to compute the discharge.

The indirect or current meter method is the most reliable and most widely used method of determining the velocity of the flow of a stream. The meter used by this survey is the Price Patent, manufactured by W. & L. E. Gurley, Troy, N.Y. It consists of six cups attached to a vertical shaft which revolves on a conical hardened steel point when immersed in moving water. The number of revolutions is indicated electrically. The rating or relation between the velocity of the moving water and the revolutions of the wheel is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run. From this data a rating table is prepared which gives the velocity per second of moving water for any number of revolutions in a given time interval.

In making a measurement with a current meter, a number of points, called measuring points, are measured off above and in the plane of the measuring section, at which observations of depth and velocity are taken. These points are spaced equally for those parts of the section where the flow is uniform and smooth, but should be spaced unequally for other parts according to the discretion and judgment of the engineer. In general, the points should not be spaced farther apart than 5 per cent. of the distance between piers, nor farther apart than the approximate mean depth of the section at the time of measurement.

The measuring points divide the total cross-section into elementary strips at each end of which observations of depth and velocity are made. The discharge of any elementary strip is the product of the average of the depths at the ends, the width of the strip, and the average of the mean velocities at the two ends of the strip. The sum of the discharges of the elementary strips is the total discharge of the stream.

The accuracy of a discharge measurement taken at a velocity area station is dependent on two factors, the accuracy with which the area of the cross-section and the mean velocity of the flow normal to that section are measured. The greatest, and the most common errors in measurements of discharge are caused by erroneous soundings. Errors in soundings by weight and line are due to the weight being carried down-stream, or, sometimes, to the bowing of the line. Both these causes make the soundings too great. Errors in soundings with rods are due

to the rod not being perpendicular, to the water rising on the rod, and to the rod sinking in the bed. In order to verify the accuracy of soundings made at medium or high stages, they should be compared with those at low water. The mean velocity is also very difficult to measure accurately, because it is constantly changing. It varies not only from the surface to the bottom but from one bank of the stream to the other, making it necessary to measure it at a number of points.

METHODS OF DETERMINING MEAN VELOCITY.

There are a number of different methods of determining the mean velocity at the ends of these strips, or, as it is commonly called, the mean velocity in a vertical, namely, multiple-point, single-point, and integration. These three principal multiple-point methods in general use are the vertical velocity-curve, three-point and two-point method.

Vertical Velocity Curve Method of Determining Mean Velocity. — In his method the centre of the meter is held as close to the surface of the water as is possible, being careful to keep it out of reach of all surface disturbances, and then at a number of different depths throughout the vertical. The velocity at each position of the meter is recorded. These observations are then plotted with velocities in feet per second as abscissae and their corresponding depths in feet as ordinates and a mean curve is drawn through the points. The mean velocity for the vertical is obtained by dividing the area bounded by the curve and its axis by the depth. In the absence of a planimeter for measuring the area, the depth is divided into 5 to 10 equal parts, and the velocities of the center ordinates of these parts are noted. The mean of these velocities will very closely approximate the mean in the vertical.

It is often more convenient, when the depth is a number of feet and a fraction, as 7.4, to divide the depth into 7 parts of a foot width, and a part of 0.4 foot width. Then the velocity to enter for the narrow part is 0.4 of the velocity at the centre of it.

The vertical velocity curve is useful is studying the manner in which velocities occur in a vertical. From a study of a number of these curves the other shorter methods of determining mean velocity are deduced. On account of the length of time taken to complete a measurement, this method is not used in general routine measurements, except during the winter, for a change of stage is almost sure to occur during a measurement on a large stream which conterbalances the increased accuracy. For this reason its use is limited to the determination of the coefficient to be used in the reduction of values obtained by other methods of measuring velocity to the true value, to the measurement of velocities under new and unusual conditions of flow, and for measurements under ice.

Three-Point Method of Determining Mean Velocity.—This method gives the greatest accuracy outside of the vertical velocity curve and is the method most commonly used by this survey during the open season. The meter is held at 0.2, 0.6 and 0.8 depth. The mean velocity is then obtained by dividing by 4 the sum of the velocities at 0.2 and 0.8 depth plus twice the velocity at 0.6 depth. It is the best method to use during low water or in wide shallow streams having a rough bed where the thread of mean velocity varies considerably from the 0.6 depth.

Two-Point Method of Determining Mean Velocity.— In studying the vertical curves made at a number of different points and under varied conditions, it has been found that the mean of the velocities occurring at 0.2 and 0.8 depth gives very nearly the mean velocity in the vertical. Use is made of this fact in the two-point method of determining mean velocity, the meter being held at 0.2 and 0.8 depth in the vertical. This method has been found more accurate than the single point method and the time required for a metering is not very much greater. This method has been found to give, also, a very close approximate to the mean velocity in measurements of ice-covered streams, although these flow under very different conditions from those of open water.

Single-Point Method of Determining Mean Velocity. — Experiments made under most favourable conditions and extending over a long period have established the point of mean velocity in a vertical at 0.6 of the depth. Therefore the error resulting from the use of the 0.6 depth as the depth of mean velocity is very small though in some few cases a study of the vertical velocity curve will show the need of a coefficient to reduce the observed velocities to the mean. The variation of the coefficient from unity in individual cases is, however, greater than in the two or three point method and the general results are not as satisfactory. For that reason this method is not employed very extensively by the survey.

In the other principal single-point method the meter is held near the surface, at from 0.5 to 1 foot below the surface, care being taken to sink the instrument below the influence of wind or waves. The resulting velocities must be multiplied by a coefficient to reduce them to mean velocities. This coefficient as found by a large number of experiments, varies from 0.78 to 0.98, depending upon the depth and speed of the stream. The deeper the stream and the greater the velocity, the larger the coefficient. In flood work coefficients varying from 0.90 to 0.95 should be used. This method is only used when the current is too strong to permit the sinking of the meter to any great depth below the surface of the water. It is often employed at times of flood, or when a stream is carrying a lot of drift wood or ice.

INTEGRATION METHOD OF DETERMINING MEAN VELOCITY.—This method of determining the mean velocity in a vertical consists in moving the meter at a slow uniform speed from the bed of the stream to the surface and return in a vertical direction, the time and revolutions being observed. In travelling through all parts of the vertical the meter is acted upon by each and every thread of velocity from the bed to the surface of the stream, and the resulting observations determine the mean in that vertical.

This method is very useful in checking the results of other methods. It is, however, seldom used by this survey as the Price meter is not suited to observations by this method, since the vertical motion of the meter causes the wheel to revolve.

GAUGING STATIONS.

The first step is to select a suitable locality for a gauging station. Although apparently simple, this is really a difficult task. Not only must the water be moving in nearly straight lines over a solid bed and between well defined banks, but the place must be accessible at moderate cost and there must be living near a competent person who can be engaged to serve as observer. Permanent gauging stations should only be selected after a very thorough reconnaissance. In the irrigation districts and in more thickly populated districts there is more or less diversion of water. This is apt to complicate matters for the hydrographer, for a gauging station above all works may not include all the tributaries of the stream and it is often necessary to establish gauging stations at several points along the streams, and on tributaries, canals, and pipe lines in order to obtain complete information regarding the water supply in a particular stream.

There are three classes of gauging stations, namely, wading, bridge and cable stations. The wading station can of course only be used in the case of small streams having a maximum depth at its highest stage of 3 feet or less. The equipment for a wading station is small, consisting usually of a plain staff gauge, graduated to feet and hundredths, and fixed vertically to one of the banks of the stream. For convenience a measuring line, usually a wire with tags, may be fixed permanently at this section. When taking the reading, the hydrographer should stand below and to one side of the meter so as to not cause eddies in the water.

Bridge stations, because of their permanency and the freedom of movement allowed the hydrographer, are much preferred. Very often, however, more particularly in swift currents, the piers materially affect the accuracy of the results. When the gauge cannot be attached to a pier, it is often attached horizontally to the guard-rail or floor of the bridge, and the height of the stream is found by lowering a weight by a chain over a pulley. It is indicated by a marker on the chain. Distances of three, five or ten feet, according to the size of the stream are marked on the lower chord of the down stream side of the bridge, to serve as a measuring line.

Frequently it is impossible to establish a permanent gauging station at a bridge. In that case the wire cable of a ferry can be utilized, or, if that is not available, a permanent wire cable is stretched across the river. For spans of average length a galvanized wire cable three-fourths of an inch in diameter is safe. It is supported at each bank by means of high struts or by passing it through the crotch of a tree. The cable is run into the ground and anchored securely to a "dead man" buried at least six feet below the surface, or, if convenient, it is anchored to the lower part of the trunk of a tree. A turnbuckle is inserted in the cable between the strut and anchorage to permit tightening the cable when it begins to sag. A permanent measuring line, usually a wire, with tags 5 or 10 feet apart, is stretched across the stream just above the cable. A cage large enough to carry two men and instruments is constructed and suspended from the cable by means of cast iron pulleys. The cage is moved from point to point by hand. A stay line, usually quarter-inch guy wire, is stretched across the stream about thirty to forty feet upstream from the cable, and securely fastened. By passing a sash cord through a pulley hung on this stay line the current meter is prevented from being carried down stream.

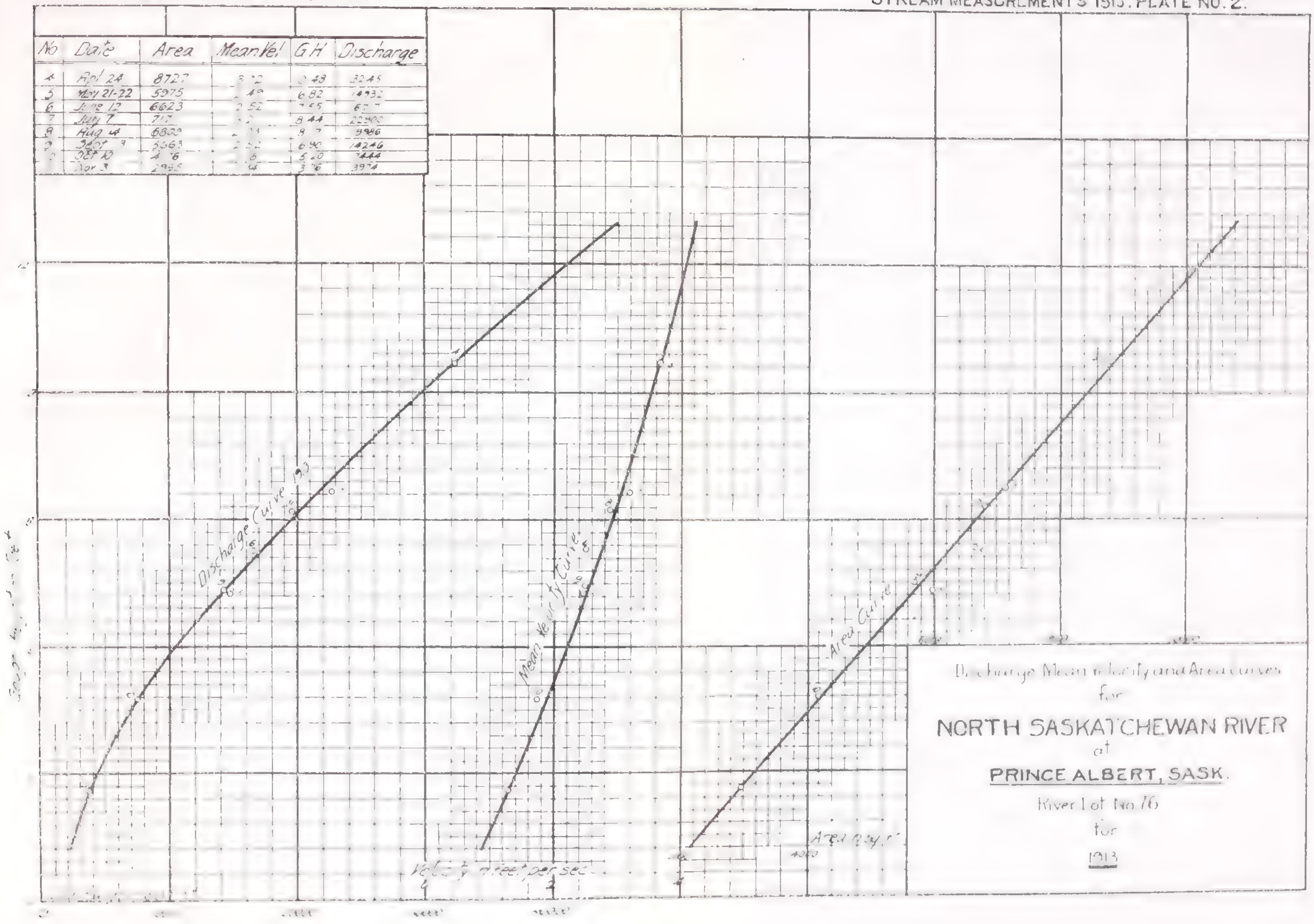
LOW VELOCITY LIMITATIONS.

Owing to the presence of a slight amount of friction in the current meter, a certain definite velocity is required to make the wheel revolve, *i.e.*, to overcome the frictional resistance of the wheel. For this reason the meter is unsuitable for the measurement of low velocities, approaching this value. This velocity, which is required to overcome friction, and which is obtained from the meter rating curve, is called the velocity of no flow for the particular meter referred to. It varies in different types of meters, and also slightly in meters of the same type, according to the time the meter is in use, but very seldom exceeds 0.2 foot per second in any meter. From a number of observations the low velocity limit, below which values of velocity are unreliable, is found to be 0.5 foot per second. In many cases at low stages the gauging station on a stream becomes unsuitable for a discharge measurement owing to the mean velocity in the section falling below the safe limit. In such instances where it is possible to wade the stream a suitable gauging section may be located within a reasonable distance of the regular station and the discharge measurements made at this point. When

DEPARTMENT OF THE INTERIOR

STREAM MEASUREMENTS 1913. PLATE NO. 2.

No	Date	Area	Mean Vel	G H	Discharge
4	Apl 24	8727	3 72	3 48	32 45
5	May 21-22	5975	2 49	6 82	14932
6	June 12	6623	3 52	7 55	67 [illegible]
7	July 7	7[illegible]	[illegible]	8 44	22400
8	Aug 4	6822	[illegible]	8 [illegible]	9986
9	Sept 3	5663	2 52	6 90	14246
[illegible]	Oct 10	4 [illegible]6	[illegible]6	5 20	[illegible]444
[illegible]	Nov 3	2965	[illegible]4	3 76	3974



Discharge Mean velocity and Area curves
for
NORTH SASKATCHEWAN RIVER
at
PRINCE ALBERT, SASK.
River Lot No 16
for
1913

a gauging is made at a cross-section other than the regular station, sufficient soundings should be made at the latter at the time of the gauging to develop the cross-section and compute the area. The measurement is thus referred to the regular gauging station and the mean velocity and area at the regular section is reported and used in the office computations.

OFFICE COMPUTATIONS.

Rating Curves and Tables.—When a series of discharge measurements has been made at a gauging station a rating curve is constructed for that station, showing graphically the discharge corresponding to any stage of the stream within the limits covered by the gaugings. This curve, as it is usually drawn, has as abscissae, the discharges in second-feet and as ordinates, the corresponding gauge heights at which the discharges were made. A smooth curve is drawn through the resulting set of points and from this curve the discharges at any stage within the limits of the curve are taken. Some measurements may be more reliable than others, owing to more or less favourable conditions at different times of gauging, or to other causes. In order to obtain the weight of the different measurements, curves with area and mean velocity, as abscissae, and gauge heights as ordinates, are also drawn. From a study of these curves any discrepancies in a measurement, either in its area or mean velocity, may be detected. Should it be necessary to extend the rating curve beyond the limits of actual discharge measurements the area and mean velocity curves may be constructed to the stages for which the discharge curve is desired and the latter found by taking the product of the two curves. The discharge curve under natural conditions of flow is always convex to the gauge height axis. The area curve is either a straight line or is convex to the gauge height axis, except in the case of overhanging banks when it becomes concave to the axis. The mean velocity curve is always concave to the gauge height axis, except in cases where standing water occurs below the stage of no-flow. In this case the curve will assume a reverse form, starting from the gauge height of zero flow with a curve convex to the gauge height axis and gradually reversing to a curve concave to this axis. In plotting all three curves the horizontal and vertical scales should be chosen that the curves may be used within the limits of accuracy for the work, and in their critical position will make, as nearly as possible, angles of 45 degrees with each axis.

The rating curve being constructed it becomes necessary to prepare a station rating table, giving the discharge at any stage of the stream within the limits of the daily gauge height observations on record. From this rating table the daily discharges corresponding to the daily gauge heights are read and tabulated. The rating table is constructed for tenths, half-tenths, or hundredths of feet, according to the readings of the gauge to which it is to be applied. The discharges for this table are read directly from the rating curve and are then adjusted so that the differences for successive stages shall be either constant or gradually increasing, but never decreasing, unless the station is affected by backwater.

Daily Discharge, Monthly Mean, and Run-Off.—The rating table being made to cover the range of daily gauge height observations, the next procedure in the computations is to make out a table of daily discharges from this rating table. The daily gauge heights are copied as they were sent in by the observer and opposite each the corresponding discharge is filled in from the rating table. The monthly discharge is found by totalling the daily discharges for the month in question, and the monthly mean is obtained by dividing this total by the number of days in the month.

The run-off is computed with two different sets of units, depending upon the kind of work for which the data is intended, as follows: (1) Run-off in inches is the depth to which a plane surface equal in extent to the drainage area would be covered if all the water flowing from it in a given time were conserved and uniformly distributed thereon; it is used for comparing run-off with rain-fall, which is usually expressed in depth in inches. The monthly mean run-off in second-feet is divided by the area of the drainage basin in square miles to find the monthly mean run-off per square mile. This result, reduced to run-off in depth in inches for the monthly period, is in the form required.

(2) The run-off in acre-feet is the form of most use in connection with storage. An acre-foot is equivalent to 43,560 cubic feet, and is the quantity of water required to cover an acre to the depth of one foot. The monthly mean run-off in second-feet is used for the computation of run-off in acre-feet. The monthly mean is reduced to cubic feet per month and this quantity divided by 43,560 gives the run-off in acre-feet.

The run-off of the stream being computed both in depth in inches and in acre-feet for each month, the run-off for the period, during which observations of run-off were made, is found by the summation of the amounts of run-off for the several months making up this period.

Changing Conditions of Channel.—On streams such as Milk River, whose bed is in a constant state of motion, measurements of discharge should be made every few days, otherwise considerable data relating to changes cannot be obtained. For discharges on days other than those on which measurements are taken, the interpolation method is used. The two methods of interpolation in general use are the Stout and Bolster methods.

The Stout method deals with the correction of the gauge heights. A curve is drawn, using the difference between the actual gauge heights at the time of measurement and the gauge height corresponding to the measured discharge as ordinates and the corresponding days of the month as abscissae. From an irregular curve drawn through these points corrections for gauge heights can be made for days on which there was no discharge measurement. When the discharge is greater than that given by the curve the correction is positive and vice-versa. Each daily gauge height is corrected by the amount shown on the correction curve, and the corresponding discharge taken from an approximate rating curve for the station.

The Bolster method deals more particularly with the modification of the discharge. Results of discharge measurements covering a whole year or season are plotted, and though considerably scattered, will define one or more regular curves, called standard curves, the number and position of each indicating the radical changes. Where the river bed changes from day to day, the position of the standard curve also varies and must pass through the points indicating the different days. The points indicating two successive measurements are joined by a line, which for short distances on the cross-section paper is a straight line and otherwise a curve. This line is divided into a number of equal parts, each indicating an intervening day, the assumption being that as the change during this period is gradual the daily rating must pass through each point or day, as represented by the divisions. A simple and convenient way of making these interpolations and moving the daily rating curve is to make a tracing of the standard curve with a vertical line of reference. By keeping the lines of reference coincident this curve can be shifted into any desired position and the discharge read for any gauge height.

WINTER RECORDS.

Formation of Ice and Ice Conditions.—Perhaps the greatest difficulties in stream measurements are met with in the early part of the winter, just as the streams are commencing to freeze up. Especially is this true in the swift running streams in or near the mountains. Needle and anchor ice often form in large quantities in rapids and flowing in masses with the water make gaugings very difficult and unreliable. Even after a permanent ice cover is obtained at the gauging station this ice will, in some cases, obstruct the channel below the station and cause "backwater".

A further difficulty is that the surface ice usually forms along the edges of the stream for some time before forming in the centre of the channel. At first this may be broken away if the stream is small and open water measurements made, but later it is necessary to take some observations through holes in the ice along the edge. As the streams get farther away from the mountains their velocity decreases, and fewer rapids occur along their course. There is then less trouble with needle and anchor ice, and a permanent ice cover forms much more quickly.

In many cases the section used during the summer is very unsuitable for making measurements during the winter. It may be. (a) too wide and shallow or flowing in two channels during the winter, due to low water; (b) partially open due to swift running water or warm water running in; (c) affected by needle and anchor ice either by flowing in the water, or causing backwater; (d) located where the snow drifts over the ice to a great depth; (e) that it is likely to have a rough ice cover or pile up with ice, due to swift water and a rough bed; (f) that there is a tendancy for ice jams to occur, with consequent backwater, etc.

It is therefore often necessary to choose a new section for winter observations. This should be done before freeze-up, for then the width, depth, uniformity of flow and conditions above and below can be easily noted. The most suitable stations for winter measurements are those which have a long stretch of very smooth, sluggish water above, and a rapid fall below.

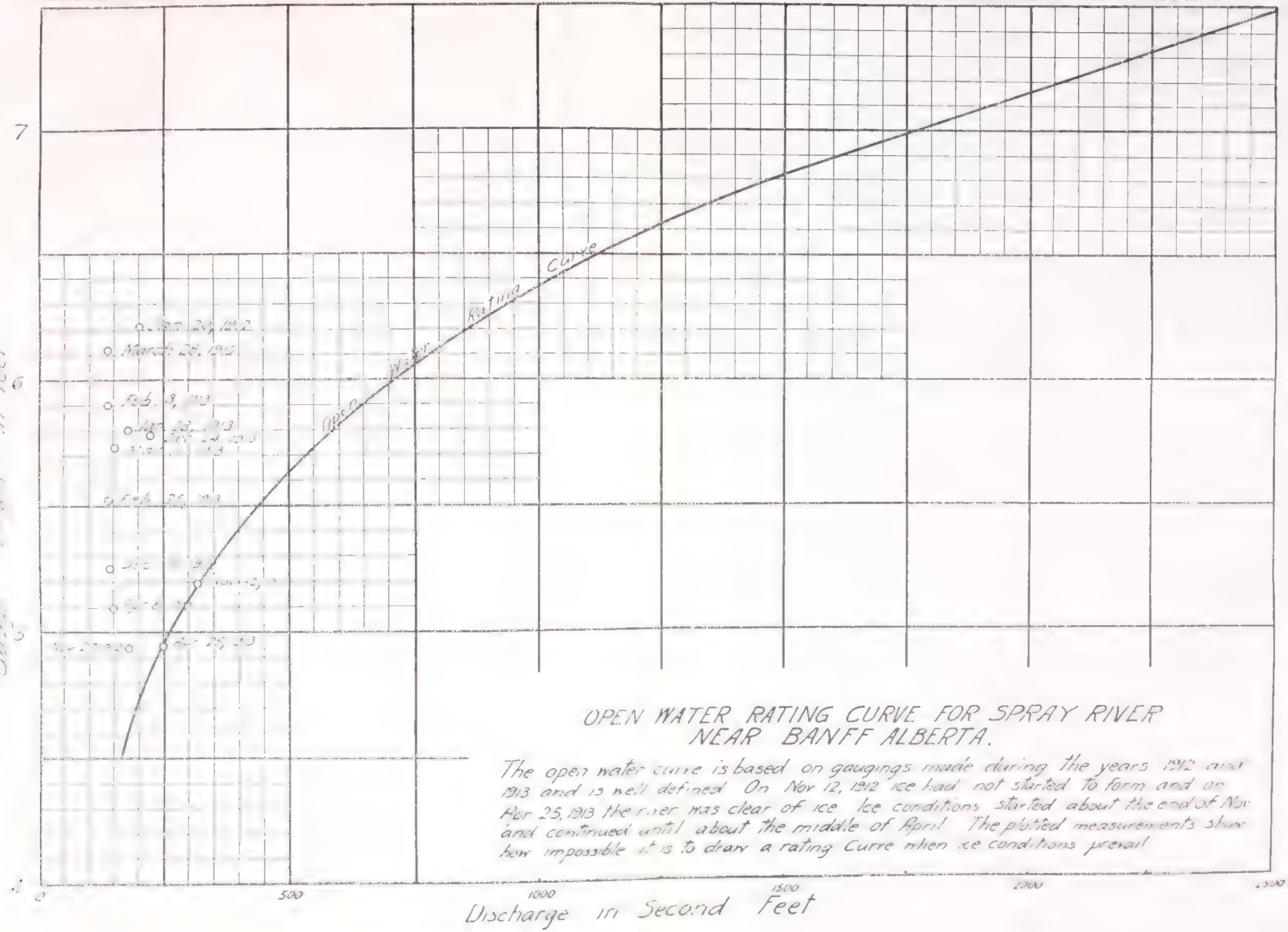
Discharge Measurements.—In winter as in summer, the daily discharges of a stream are computed from frequent discharge measurements, and daily gauge height observations. The discharge measurements are made through holes in the ice from five to ten or even twenty feet apart, depending upon the size of the stream, and large enough to allow the current meter to pass through freely. The gaugings are made in the same manner as at open sections except that the depth of the stream is taken as the distance from the bottom of the ice to the bed of the stream. The soundings, however, are always referred to the surface of the water in the holes, the distance from the surface of the water to the bottom of the ice being measured and subtracted from the soundings to obtain the depth.

The vertical velocity curve method is usually used for the determination of the mean velocity in the vertical. A curve is plotted for each vertical, and the mean velocity is determined in the usual manner. These curves vary greatly as to form for different kinds and conditions of channel.

The typical curve, however, differs from that obtained from an open water observation in that it is drawn back more at the surface, owing no doubt to greater friction between the ice and the water as compared with the water and the atmosphere. As a result there are two points in the vertical at which the thread of mean velocity occurs under an ice cover. These points are near 0.2 and 0.8 of the total depth below the bottom of the ice, and the mean of the

DEPARTMENT OF THE INTERIOR

STREAM MEASUREMENTS 1913. PLATE NO 3.



OPEN WATER RATING CURVE FOR SPRAY RIVER NEAR BANFF ALBERTA.

The open water curve is based on gaugings made during the years 1912 and 1913 and is well defined On Nov 12, 1912 ice had not started to form and on Nov 25, 1913 the river was clear of ice Ice conditions started about the end of Nov and continued until about the middle of April The plotted measurements show how impossible it is to draw a rating Curve when ice conditions prevail

of the velocities at these two depths will give fairly accurate results, but when close estimates of the discharges are required, and the conditions are not very favourable, the vertical velocity method should be used.

It is found that when all the holes are opened on a small swift stream, there are sometimes vertical pulsations of the water in the holes, which affect the velocity readings. This can usually be avoided by only opening one hole at a time, and filling it in again with ice and snow as soon as the observation is finished. It can also be overcome by inserting a thin sheet of galvanized tin or iron at the bottom of the hole, after the meter has been lowered into the water. The meter should always be held near the upstream side of the hole.

In using the meter care must be taken to keep it under the water as much as possible to prevent ice from forming around the bearings. It is a good plan to clean and oil the meter indoors before starting out to make a gauging.

Gauges and Gauge Observations.—The gauge is usually read once each day, the observer noting the elevation of the water as it rises in a hole cut through the ice, the height of the top of the ice, the thickness of the ice, presence of needle or slush ice, snow on top of ice, ice jams, and any sudden changes in temperature. To do this the observers are provided with an ice chisel for chopping holes, and an L — shaped ice scale to measure the thickness of the ice.

A difficulty which arises, in obtaining the thickness of the ice is that in a hole kept open for some time the ice wears away around the bottom of the hole, and may make it necessary to cut a new hole nearby, or to enlarge the original.

Any form of gauge may be used, but the chain gauge is the most satisfactory as the staff gauge, being frozen to the ice, heaves with it, and also in cutting away the ice from around it the figures are effaced. The automatic gauge gives trouble with the well freezing over.

Estimates of Daily Discharge.—While the run-off, particularly during the winter months, does not vary directly in accordance with the precipitation, the rate at which it reaches the streams is of course, dependent almost entirely upon the climatic conditions. The climate in the mountains is subject to great extremes but during the winter almost the entire precipitation is in the form of snow.

There is therefore very little surface run-off and the flow of the streams comes almost entirely from the glaciers, ground waters and lake storage, and except for the losses due to freezing and the slight increases, due to the melting of snow and ice by chinooks (warm winds), the flow in the streams would remain constant or would change gradually.

There are, however, certain local conditions in Western Canada which make it exceptionally difficult to make estimates of the daily discharge during the winter. The gauge height in many cases fluctuates very much, and often sudden rises or drops occur. These rises are often explained by the fact that during very cold spells a great deal of slush, frazil, and anchor ice is formed and chokes up the channel, thus raising the surface of the water, when it reality the discharge is decreasing. Then, again, a chinook causes a sudden rise in temperature and the discharge is often increased while at the same time the gauge height gradually lowers, evidently because the warmer weather and water have melted out a lot of the ice from the channel and given it a greater carrying capacity.

In order to make reliable estimates of the daily discharge, gaugings must be made at short intervals and the weather conditions and temperatures in the whole of the drainage area above the station must be very carefully studied.

W. G. Hoyt, District Engineer, Water Resources Branch, U. S. Geological Survey, has made an exhaustive study of methods for estimating the flow when streams are frozen. The various methods described by him in an article in "Engineering News" on April 10, 1913, and Water-Supply Paper 337, published by the United States Geological Survey, in 1913, and modifications of them are used. The graphic method of interpolation has been found to be generally applicable, but as the precipitation during the winter months has so little affect upon the run-off during that period, it is seldom plotted on the sheets. It is also considered that the extremes and ranges of temperatures are better guides for interpolation than the mean temperatures and the minimum and maximum temperatures are both plotted and given due consideration rather than the mean temperatures.

The weather conditions and temperatures at the gauging station are not always typical for the whole drainage basin above and care must therefore be taken to have the meteorological observations made at some other place, or if necessary, at two or more places. Of course, care must be taken to study all the possible conditions which may affect the estimates.

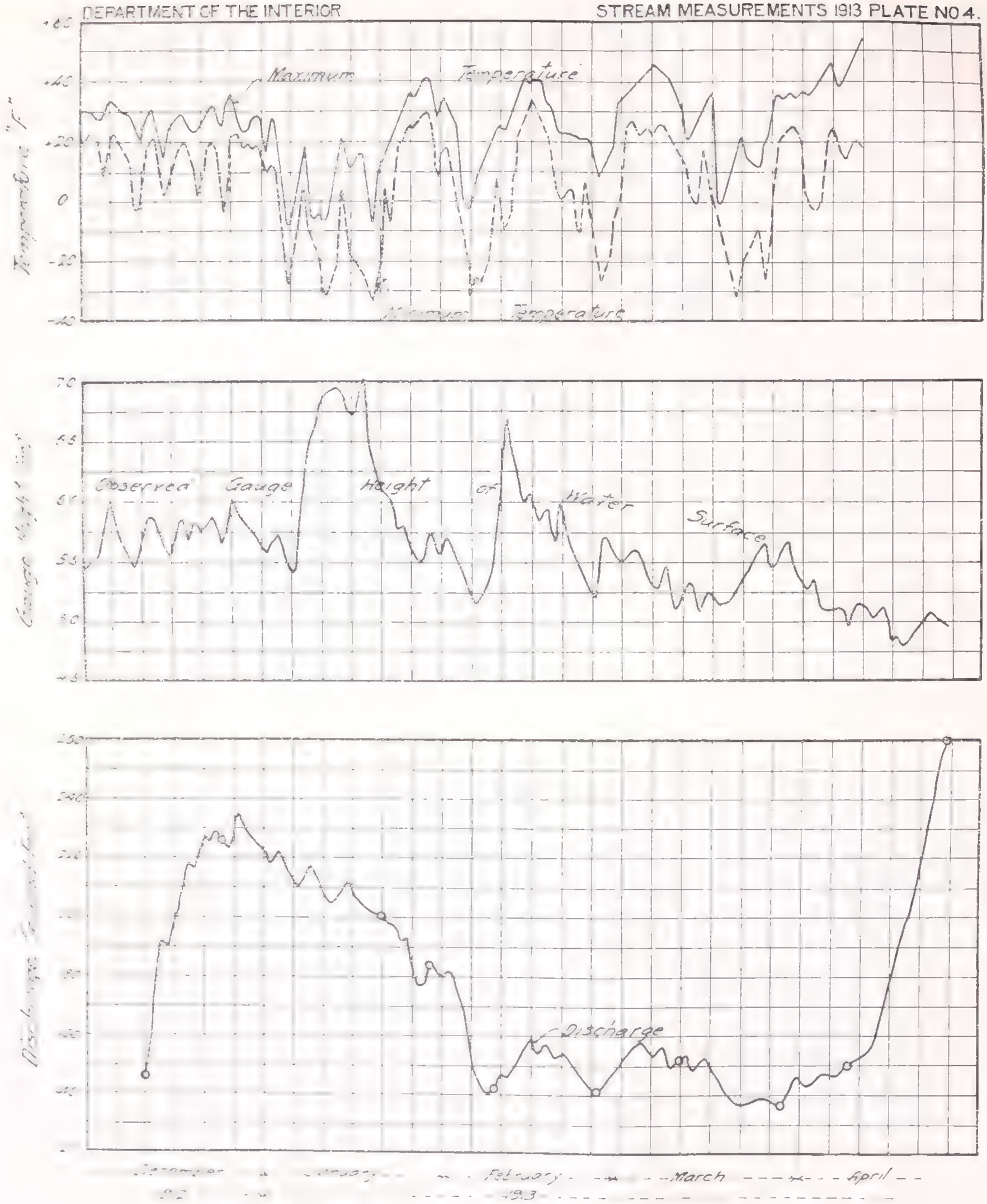
Plate 4 shows typical conditions and illustrates the graphic method of interpolating the daily discharges.

RATING CURRENT METERS.

Each meter is rated before being used, in order to determine the relation between the revolutions of the wheel and the velocity of the water. The meter is driven at a uniform rate of speed through still water for a given distance, and the number of revolutions of the wheel and the time are recorded. From this data the number of revolutions per second and the corresponding velocity per second are computed. Tests are made for speeds varying from the slowest which will cause the wheel to revolve to several feet per second. The results of these runs, when plotted with revolutions per second as abscissae, and velocity in feet per second as ordinates, locate points that define the meter rating-curve, which for all meters is practically a straight line. From this curve a meter rating table is prepared. Theoretically, the rating for all meters of the same make and type should be the same, but as a result of slight variations in construction and in the bearing of the wheel on the axis at different velocities, the ratings differ.

After a meter has been in use for some time the cups may have received small injuries, or the bearing of the wheel on the axis may have changed owing to unavoidable rough usage. These changes will affect the running of the meter and change its rating. As a consequence each meter is re-rated at regular intervals and a new rating curve and table prepared.

Descriptions of the rating station, discussions of the methods employed,and the results of ratings, are given in the Reports of Progress of Stream Measurements for the years 1911 and 1912.



OBSERVATIONS OF GAUGE HEIGHTS ON SPRAY RIVER NEAR BANFF WITH CORRESPONDING MAXIMUM AND MINIMUM TEMPERATURE AND THE ESTIMATED DAILY DISCHARGES FOR THE WINTER 1912-1913

The circles on the discharge curve indicate actual discharge measurements. Note the rise in gauge height in January and February when the temperature was lowest and the discharge measurements showed that the flow was decreasing

ATHABASCA RIVER DRAINAGE BASIN.

General Description.

Athabasca River rises on the eastern slope of Rocky Mountains and flows in a northeasterly direction for about one thousand miles, eventually emptying into Lake Athabasca.

The Athabasca basin forms the most southerly portion of the great Mackenzie system and the portion dealt with in this report comprises only the headwaters.

Rising in country very similar to the watershed of the other streams of importance in Alberta, it flows out of the mountains and then through foothill country. From the foothills to the lake the basin consists of stretches of muskeg and uplands, well timbered with spruce and pine.

The general character of the basin is such that the winter precipitation or snowcover is conserved to a great extent and floods in the early spring are not usual. However in June, July and August rains and warm winds cause the upper parts of the system to discharge large quantities of the snow water from the higher peaks and glaciers and when rains of any magnitude occur the invariable result is a flood. The muskeg country is a great source of storage but, when its capacity is reached, it accelerates rather than retards the run-off.

The main transcontinental lines of the Grand Trunk Pacific and the Canadian Northern Railways cross the upper portion of this drainage basin, and transportation is now a much easier problem than in the past.

Many valuable deposits of coal, limestone and other minerals are found in this basin, and, on account of these as well as the many power possibilities and stretches of timber and pulpwood, it is expected that this country will develop very much during the next few years.

During 1913, a few stations were established in this basin and a regular hydrographer employed who made a number of miscellaneous measurements. As the country is settled, more stations will be established where necessary and much better records obtained.

A very full description of this drainage basin is attached as an appendix to this report

MIETTE RIVER NEAR JASPER.

This station was established August 23, 1913, by G. J. Smith. It is located on the S.W. ¼ Sec. 9, Tp. 45, Rge. 1, W. 6th, Mer., at the second traffic bridge about 2 ½ miles southwest of Jasper, and about one mile upstream from the mouth of the river.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to the downstream face of the left pier. The zero of the gauge (elev. 88.45) is referred to a spike head (assumed elev. 100.00) located on the top of the left abutment on the downstream side.

The channel is straight for 150 feet above and 100 feet below the station. Both banks are high, well wooded, and not liable to overflow. The bed of the stream is gravel and sand but is not liable to shift. The current is swift.

Measurements are made with a meter and weights from the downstream side of the bridge, which is a three span timber structure. The initial point for soundings is the bench mark referred to.

During 1913, no observations of gauge height were obtained.

DISCHARGE MEASUREMENTS of Miette River, near Jasper, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height	Discharge.
		Feet	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Feb. 13	V. Meek	48	30	0.64		20
Mar. 5	do	45	26	.62		16
April 5	do	55	32	0.57		18
April 26	do	51	72	1.54		110
May 17	J. S. Wright	54	105	1.54		161
June 5	do	92	831	2.83		2,356
June 25	G. J. Smith	66	645	2.53		1,643
July 7	do	89	735	1.80		1,325
July 15	do	81	484	1 19		569
July 31	do	80	484	1 13		546
Aug. 20	do	80	478	1.25		599
Sept. 4	do	66	355	1 53	5 53*a*	544
Sept. 9	A. Tallentire	66	409	2.01	6.06	824
Sept. 11	do	66	337	1.50	5.07	507
Sept. 13	do	66	309	1.44	4.98	444
Oct. 2	G. J. Smith	66	271	1.04	4.46	280
Oct. 27	P. H. Daniells	67	87	1.62	3.76	141
Nov. 10	do	50	85	1.14	3.34	97
Nov. 29	do	58	95	0.72	3.60	68
Dec. 10	do	62	87	0.57	2.58	50

a. Guage established Aug. 23.

ATHABASCA RIVER AT JASPER.

This station was established March 4, 1913, by V. Meek. It is located on the N. W. ¼ Sec. 15, Tp. 45, Rge. 1, W. 6th Mer., and is one half mile east of the Grand Trunk Pacific Station and about three-fourths of a mile below the mouth of the Miette River.

The gauge, which is a plain staff graduated to feet and hundredths, is placed at the left bank about 200 feet downstream from the cable. The zero of the gauge, (elev. 83.81) is referred to a permanent iron bench mark (assumed elev. 100.00) located 20 feet upstream from the gauge.

The channel is straight for about 800 feet above and below the station. The left bank is high and will not overflow, while the right is low and liable to overflow. A small channel some 70 yards from the main stream on the right side has to be measured during high water. The bed of the stream is of gravel which shifts slighly during flood stages. At low water the channel is broken into two channels by gravel bars. The current is fairly swift.

Discharge measurements are made from the cable and car. The initial point for soundings is the cable frame on the left bank. Distances are marked on the cable every ten feet. The small channel on the right side is measured by wading.

During 1913 the gauge was read once daily for various periods by Lawrence MacDonald, H. A Nutting and George Thompson.

DISCHARGE MEASUREMEMTS of Athabasca River near Jasper, in 1913

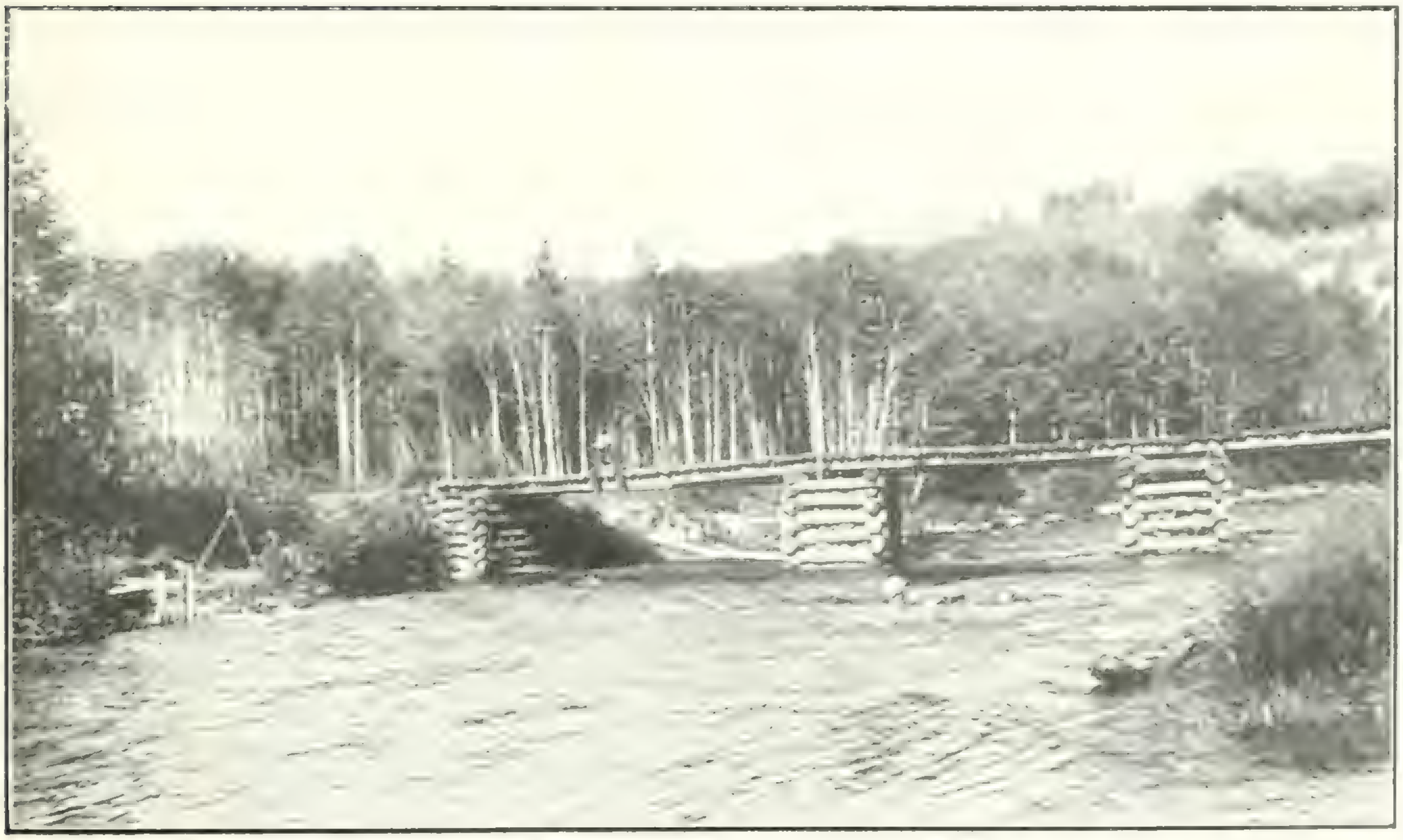
Date.	Hydrographer	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	Sec.-ft.
Feb. 13	V. Meek	92	382	0.77		293
Mar. 4	do	120	163	1.63	0.87	265
April 4	do	113	160	1.61	0.80	258
April 25	do	162	228	3.03	1 38	691
May 14	J. S. Wright	442	476	2.11	1.71	1,001
July 1-2	G. J. Smith	407	1,688	5.51	5 22	9,297
July 8-9	do	406	1,558	5.17	4 84	8,063
July 16-17	do	397	931	5 09	3 40	4,740
Aug. 1-2	do	408	1,769	6 09	5 61	10,768
Aug. 5	do	416	1,893	6 41	5 89	12,124
Aug. 22	do	405	1,182	5 04	4.07	5,961
Sept. 5	do	406	1,402	5.28	4 56	7,405
Sept. 22	do	352	755	4 68	2 83	3,533
Oct. 4	P. H. Daniells	267	561	4 67	2 04	2,625
Oct. 25	do	232	386	3.80	1.21	1,465
Nov. 11	do	187	235	3.87	0.72	909
Nov. 26	do	180	228	3 53	3.28	804
Dec. 11	do	220	263	2 18	3.02	575

PLATE No. 5



Cable station on Athabasca River at Jasper, Alberta.

PLATE No. 6



Gauging Station on Lobstick River near Entwhistle, Alberta.

Daily Gauge Height and Discharge of Athabasca River, near Jasper, for 1913

Day	March		April		May		June		July	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1			1.65						5.38	9,060
2			1.65						5.15	9,878
3			1.65						4.71	7,699
4			1.70						4.40	6,860
5			1.75*a*						4.74	7,786
6									4.40	6,860
7									5.79	11,632
8									4.78	7,902
9		0.82*a*							4.60	7,390
10		0.83							4.50	7,120
11		0.85							4.70	7,670
12		1.05							4.51	7,147
13		1.30							3.41	4,660
14		1.47							3.40	4,640
15		1.47					5.15*b*		3.42	4,680
16		1.30					4.80		3.34	4,526
17		1.35					4.10		3.30	4,450
18		1.40					3.35		3.34	4,526
19		1.57					4.63		4.40	6,860
20		1.85					6.53		5.21	9,266
21		1.87					5.68		5.28	9,518
22		1.88					5.20		5.35	9,770
23		1.90					4.90			*c*
24		1.95					4.80			
25		1.95					5.50			
26		1.95					4.91			
27		1.98					4.75			
28		2.00					4.90			
29		1.55					4.43			
30		1.60					5.30*b*			
31		1.65								

a Not sufficient data to compute discharge.
b Not sufficient data to compute discharge.
c No gauge height observations taken.

Daily Gauge Height and Discharge of Athabasca River, near Jasper, for 1913
Concluded

Day.	August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	....*d*	.....	4.45	6,990	2.12	2,548	1.00	1,160	0.60	780
2	.....	.....	3.25	4,355	2.60	3,240	0.89	1,050	0.55	735
3	.....	.....	3.35	4,545	2.22	2,688	0.84	1,000	0.60	780
4	.....	.....	4.60	7,390	1.95	2,310	0.93	1,090	0.58	762
5	5.68	11,110	4.35	6,735	1.82	2,136	0.90	1,060	0.60	780
6	6.14	13,428	3.70	5,250	1.70	1,980	0.92	1,080	0.57	753
7	5.46	10,178	3.30	4,450	1.65	1,920	0.85	1,010	0.63	807
8	5.86	11,980	3.25	4,355	1.45	1,680	0.81	970	0.61	789
9	6.01	12,752	4.05	6,015	1.40	1,620	0.86	1,020	0.62	700
10	5.86	11,980	3.40	4,640	1.35	1,560	0.78	942	0.59	600
11	5.69	11,155	3.10	4,080	1.32	1,524	0.70	870	0.55	575
12	5.42	10,026	3.00	3,900	1.67	1,944	0.78	942	0.47	575
13	5.21	9,266	3.40	4,640	1.73	2,019	0.80	960	0.35	575
14	5.01	8,602	3.05	3,990	1.76	2,058	0.79	951	0.27	519
15	4.86	8,140	3.00	3,900	1.68	1,956	0.80	960	0.20	470
16	4.63	7,474	2.90	3,730	1.60	1,860	0.77	933	0.17	449
17	4.52	7,174	3.20	4,260	1.53	1,776	0.66	834	0.13	421
18	4.41	6,886	3.40	4,640	1.40	1,620	0.45	650	0.12	414
19	4.32	6,660	3.00	3,900	1.32	1,524	0.65	825	0.09	391
20	4.28	6,562	2.70	3,400	1.23	1,416	0.80	960	0.03	351
21	4.25	6,490	2.73	3,448	1.20	1,380	0.78	942	2.95	381
22	4.16	6,274	2.70	3,400	1.18	1,358	0.75	915	2.92	400
23	4.32	6,660	2.37	2,898	1.35	1,560	0.73	897	2.68	400
24	4.95	8,415	2.30	2,800	1.38	1,596	0.82	980	2.57	425
25	4.76	7,844	2.12	2,548	1.31	1,512	0.88	1,040	2.68	425
26	4.63	7,474	2.03	2,422	1.23	1,416	0.75	915	2.50	450
27	4.60	7,390	2.10	2,520	1.11	1,281	0.62	798	2.20	450
28	4.00	5,900	2.35	2,870	1.05	1,215	0.57	753	1.85	475
29	4.85	8,110	2.23	2,702	1.04	1,204	0.50	690	1.73	475
30	4.50	7,120	2.18	2,632	1.00	1,160	0.53	717	1.60	500
31	4.55	7,255	.....	.....	0.95	1,110	.....	.....	1.70	500

d No gauge height observations.

Monthly Discharge of Athabasca River, near Jasper, for 1913

(Drainage area, 1,600 square miles)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
July (1-22)	11,632	4,450	7,268	4,540	3.71	317,157
August (5-31)	13,428	5,900	8,604	5.387	5.40	460,770
September	7,390	2,422	4,114	2.571	2.87	244,770
October	3,240	1,110	1,748	1.092	1.26	107,459
November	1,160	650	930	0.581	0.65	55,369
December	807	351	552	0.345	0.40	33,929
The period					14.29	1,219,454

ROCKY RIVER NEAR HAWES.

This station was established July 3rd, 1913, by G. J. Smith. It is located on the N.W. ¼ Sec. 13, Tp. 48, Rge. 28, W. 5th Mer., about three-fourths of a mile east of Hawes Station on the Grand Trunk Pacific Railway and about 300 yards from the point where the Rocky enters the Athabasca River.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to the cribbing of the bridge on the right bank. The zero of the rod, (elev. 90.91) is referred to a bench mark (assumed elev. 100.00) located on the downstream side of the right abutment of the bridge and marked B.M. with blue paint.

The channel is straight for 150 feet above and 200 feet below the station. Both banks are low above and below the bridge but the protecting wall above and below the bridge will keep the stream from overflowing at the station. The bed of the stream is of gravel and will shift at flood stages. The bridge pier divides the channel into two sections at high stages. The current is swift.

Measurements are made from the downstream side of the railway bridge. The initial point for soundings is the stream face of the right abutment and is marked on the bridge floor with an arrow and I. P. in blue paint.

During 1913, the gauge rod was read twice each day by H. G. Barden.

DISCHARGE MEASUREMEMENTS of Rocky River at Hawes, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	Ft. per sec	*Feet.*	*Sec.-ft.*
Feb. 15	V. Meek	40	30	3.08		94
Mar. 10	do	35	28	3.08		88
April 9	do	33	33	2.81		92
April 30	do	40	33	2.52		83
May 19	J. S. Wright	62	84	2.34		198
June 9	do do	199	485	5.40	3.10	2,618
July 3	G. J. Smith	132	305	4.20	2.64	1,282
July 14	do		250	3.48	2.23	869
July 29	do	193	334	5.04	2.86	1,683
Aug. 19	do	135	284	3.72	3.13	1,055
Sept. 2	do	120	203	3.04	2.73	617
Sept. 16	do	121	155	3.08	2.69	478
Sept. 29	do	105	138	2.68	2.51	370
Oct. 7	P. H. Daniells	108	126	2 52	2.48	316
Oct. 24	do	109	121	1.96	2.37	234
Nov. 9	do	105	101	1.67	2.20	169
Nov. 25	do	75	84	1.53	2.64	128
Dec. 14	do	128	133	0.51	3.10	79

Daily Gauge Height and Discharge of Rocky River at Hawes, for 1913

Day	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	.....	.....	2.42	1,034	2.76	611	2.47	320	2.32	204	2.93	110
2	.....	.....	2.40	1,014	2.74	589	2.55	392	2.32	204	3 00	110
3	2.64*a*	1,288	2.30	927	2.68	524	2.59	430	2.34	218	3.06	110
4	2.49	1,105	2.34	962	2.72	567	2.56	402	2.28	184	3.02	100
5	2.38	997	2.28	906	2.94	818	2.51	354	2.24	172	3 06	100
6	2.35	970	2 .29	914	2.94	818	2.48	328	2.24	172	3 02	100
7	2.80	1,556	2.26	890	2.88	747	2.48	328	2.23	169	3.24	100
8	2.63	1,274	2.60	1,230	2.85	712	2.46	311	2.21	163	3.06	90
9	2.38	997	3.91	4,275	2.92	794	2.45	302	2.21	163	3 02	90
10	2.45	1,064	3 94	4,190	2.91	782	2.44	294	2 20	160	3 21	90
11	2.55	1,172	3.82	3,790	2.84	701	2.42	277	2.26	178	3 16	90
13	2.34	962	3.73	3,450	2.78	633	2.45	302	2.30	190	3 13	80
13	2.25	882	4.06	4,140	2.78	633	2.50	345	2.30	190	3.14	80
14	2.24	874	4.02	3,925	2.80	655	2.47	320	2.30	190	3.15	80
15	2.23	866	3.76	3,140	2.76	611	2.44	294	2.28	184	3.12	80
16	2.24	874	3.51	2,410	2.71	556	2.42	277	2.28	184	3.22	80
17	2.23	866	3.43	2,030	2.71	556	2.40	260	2.27	181	3.15	80
18	2.29	914	3.32	1,580	2.74	589	2.38	246	2.24	172	3.06	90
19	2.42	1,034	3.10	1,015	2.71	556	2.38	246	2.26	178	2.40	90
20	2.52	1,138	3.02	915	2.66	503	2.38	246	2.54*b*	170	1.62	90
21	2.56	1,182	2 94	866	2.64	482	2.39	253	2.39	160	. . .	90
22	3.02	2,053	2.92	794	2.64	482	2.36	232	2.41	150	. . .	90
23	2.76	1,484	2.90	770	2.61	450	2.38	246	2.58	140	. .	100
24	2.70	1,386	2.92	794	2.58	421	2.38	246	2.72	130	2.50	100
25	2.66	1,318	2.89	758	2.56	402	2.38	246	2.67	130	.....	100
26	2.51	1,126	2.86	724	2.55	392	2.36	232	2.66	130	...	100
27	2.36	979	2.86	724	2.54	383	2.35	225	2.65	130	3 30	110
28	2.93	1,838	2.79	644	2.53	374	2.36	232	2.69	120	3.66	110
29	3.02	2,053	2.78	633	2.52	364	2.32	204	2.78	120	3.85	110
30	2.61	1,245	2.76	611	2.49	336	2.31	197	2.86	120	3.68	110
31	2.48	1,095	2.81	666	.....	.....	2.34	218	.....	.....	4 00*c*	110

a. Station established.
b to c. Ice conditions discharges estimated.

Monthly Discharge of Rocky River at Hawes, for 1913.

(Drainage area, 428 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
July (3-31)	2,053	866	1,193	2.79	3.01	68,622
August	4,275	611	1,636	3.82	4.40	100,594
September	818	336	568	1.32	1.47	33,798
October	430	197	284	0.66	0.76	17,462
November	218	120	165	.39	.43	9,818
December	110	80	96	0.22	0.26	5,903
The period	.....	.....	.....	.....	10.33	236,197

LOBSTICK RIVER NEAR ENTWISTLE.

This station was established on July 11, 1913, by G. J. Smith. It is located on a wooden bridge on the N.E. ¼ Sec. 30, Tp. 53, Rge. 7, W. 5th Mer., about 1 mile upstream from where this river empties into the Pembina river, and about 2½ miles northwest of the village of Entwistle.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to the right bank 40 feet downstream from the bridge. The zero of the gauge (elev. 96. 17) is referred to a bench mark (assumed elev. 100.00); the bench mark is a nail head on top of the 6th log below the bridge floor, on the right side of the first pier, 28.5 feet from the I.P. and on the downstream side of the bridge.

The channel is straight for 100 feet above and 200 feet below the station. Both banks are high and wooded, and will not overflow. The bed of the stream is composed of rocks and gravel and is liable to shift. The current is swift.

Discharge measurements are made from the downstream side of the bridge, with current meter, rods and stay wire. The initial point for soundings is an arrow head marked I.P. cut in the woodwork of the right abutment on the downstream side of the bridge.

During 1913, the gauge was read by C. R. McKillop.

DISCHARGE MEASUREMEMENTS of Lobstick River near Entwhistle, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Feb. 20	V. Meek	34.0	34.0	1.17	.....	40.0
Mar. 14	do	26.0	25.8	1.48	.....	38.4
May 23	J. S. Wright	77.0	108.0	1 72	.....	186.0
Jun. 11	do	51.4	69.9	2 26	.....	158.0
July 4	G. J. Smith	64.0	130.6	3.47	.....	453.0
July 11	do	63.5	100.8	2 94	3.05	297.0
July 21	do	64.0	104.9	3.22	3.25	337.0
Aug. 9	do	64.5	105.0	3.18	3.14	335.0
Aug. 25	do	64.5	105.0	3 16	3.15	332.0
Sept. 9	G. H. Whyte and G. J. Smith	64 5	94.4	2.81	2.91	265.0
Sept. 23	G. J. Smith	64.5	95.0	2.65	2.86	252.0
Oct. 20	P. H. Daniells	54.5	80.4	2 29	2 58	185.0
Nov. 4	do	37.5	69.4	2.59	2.48	180.0
Nov. 19	do	38.5	70 4	0.20	3.12	144.0
Dec. 31	do	37.0	48.2	1.81	3.36	87.0

Daily Gauge Height and Discharge of Lobstick River, near Entwhistle, for 1913

Day.	July		August		September		October	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	.....	.....	3.12	313	3.08	303	2.75	228
2	.....	.....	3.06	298	3.04	294	2.75	229
3	.....	.....	3.05	296	3.00	284	2.75	228
4	.....	.....	3.05	296	3.00	284	2.75	228
5	.....	.....	3.05	296	3.00	284	2.75	228
6	.....	.....	3.08	303	3.00	284	2.70	217
7	.....	.....	3.08	303	2.96	274	2.66	208
8	.....	.....	3.10	308	2.90	261	2.66	208
9	.....	.....	3.06	298	2.98	279	2.66	208
10	.....	.....	3.00	284	3.00	284	2.66	208
11	3.05*a*	296	3.00	284	2.96	274	2.66	208
12	3.02	289	3.03	291	2.89	259	2.66	208
13	3.00	284	3.10	308	2.90	261	2.67	210
14	3.45	392	3.10	308	2.88	257	2.66	208
15	3.85	488	3.18	327	2.84	248	2.66	208
16	3.85	488	3.42	385	2.80	239	2.66	208
17	3.60	428	3.70	452	2.80	239	2.65	206
18	3.45	392	3.70	452	2.85	250	2.65	206
19	3.35	368	3.55	416	2.96	274	2.65	206
20	3.25	344	3.50	404	2.95	272	2.64	204
21	3.16	322	3.42	385	2.92	265	2.64	204
22	3.09	306	3.36	370	2.86	252	2.64	204
23	3.05	296	3.30	356	2.85	250	2.63	202
24	3.00	284	3.27	349	2.82	243	2.60	195
25	3.02	289	3.18	327	2.77	232	2.58	191
26	3.02	289	3.08	303	2.75	228	2.56	186
27	3.00	284	3.09	306	2.75	228	2.56	186
28	3.05	296	3.06	298	2.75	228	2.53	180
29	3.15	320	3.05	296	2.75	228	2.54	182
30	3.24	342	3.05	296	2.75	228	2.36	146
31	3.22	337	3.05	296	.....	.....	2.30	134

a Observations commenced.

Monthly Discharge of Lobstick River, near Entwhistle, for 1913

(Drainage area, 717 square miles)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
July (11–31)	488	284	340	0.474	0.37	14,162
August	452	284	329	0.459	0.53	20,229
September	303	228	260	0.363	0.40	15,471
October	228	134	202	0.282	0.32	12,420
The period	.....	.....	.....	.....	1.62	62,282

ATHABASCA RIVER AT ATHABASCA.

This station was established February 27, 1913, by V. Meek It is located on the S.E. ¼ Sec. 20, Tp. 66, Rge. 22, W. 4th Mer., in the town of Athabasca.

The gauge, which is a plain staff divided to feet and half-tenths, is attached to a pier a little above the ferry cable and about 50 feet from the left bank.

Measurements of the winter discharge were obtained at this station and the Public Works of Canada obtained gauge heights. It is expected that full data on this station will be obtained next year which will be published in the report for 1914.

Discharge Measuremeмtns of Athabasca River at Athabasca, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Feb. 27	V. Meek	655	1,971	1.43	.....	2,820
Mar. 29	do	650	1,853	1.27	3.45	2,368
Dec. 5-6	P. H. Daniells	703	4,141	1.41	4.00	4,313
Dec. 23-24	do	695	3,234	1.26	3.07	4,077

Miscellaneous Discharge Measuremements made in Athabasca River drainage basin, in 1913.

Date.	Hydrographer.	Stream	Location	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. ft.*	*Ft. per sec.*	*Sec. ft.*
Feb. 14	V. Meek	Athabasca River	N.E. 5-51-25-5	182	933	1.09	1,017
Mar. 11	do	do	do	193	961	1.14	1,099
Apr. 10	do	do	do	235	932	1.49	1,396
Mar. 7	do	do	Athabasca Falls	36	67	2.74	183
Apr. 8	do	do	do	63	113	1.31	149
" 28	do	do	do	57	87	3.74	325
May 15	J. S. Wright	do	do	129	221	2.33	516
July 23	G. J. Smith	Embarras River	S.W. 5-52-18-5	127	121	2.34	283
Aug. 12	do	do	do	185	207	2.66	551
" 28	do	do	do	128	116	2.02	235
Sept 11	do	do	do	121	96	1.54	148
Oct. 9	P. H. Daniells	do	do	122	220	0.76	168
Nov. 21	do	do	do	105	106	0.46	49
Dec. 18	do	do	do	105	111	0.46	51
Sept. 13	G. J. Smith	do	S. 33-48-21-5	17	12	1.41	17
Nov. 7	P. H. Daniells	do	N. 33-48-21-5	113	150	0.68	99
Aug. 10	G. J. Smith	Edson River	S.E. 16-54-16-5	49	86	0.88	76
Aug. 27	G. J. Smith	Edson River	S.E. 16-54-16-5	46	83	0.78	64
Sept. 10	do	do	do	49	73	0.56	41
Sept. 26	do	do	do	45	33	1.18	39
Oct. 10	P. H. Daniells	do	do	40	31	1.06	33
July 28	G. J. Smith	Fiddle Creek	15-49-27-4	46	44	3.24	143
Aug. 18	do	do	do	80	85	3.60	304
Sept 1	do	do	do	47	37	2.50	92
" 16	do	do	do	46	32	2.34	75
Oct. 24	P. H. Daniells	do	do	30	21	2.05	43
Nov. 24	do	do	do	26	11	0.81	9
Sept. 10	G. J. Smith	Maligne River	45-28-5	50	46	2.70	124
Oct. 6	P. H. Daniells	do	do	26	25	1.28	32
Nov. 13	do	do	do	21	21	0.28	6
" 28	do	do	do	20	8	0.43	3
Dec. 13	do	do	do	14	2	0.78	2
Feb. 17	V. Meek	McLeod River	33-52-17-5	140	151	0.64	96
" 18	do	do	N.W. 5-52-18-5	47	46	1.30	59
Mar. 13	do	do	do	47	52	1.81	95
Apr. 12	do	do	do	80	180	1.69	304
May 22	J. S. Wright	do	do	172	611	3.00	1,840
June 10	J. S. Wright	do	do	176	580	2.87	1,666
July 5	G. J. Smith	do	do	178	627	2.76	1,731
" 12	do	do	do	155	465	2.03	947
" 22	do	do	do	152	399	1.64	653
Aug. 10	do	do	do	178	644	2.59	1,670
" 28	do	do	do	144	394	1.45	572
Sept. 11	do	do	do	133	313	1.15	361
Oct. 9	P. H. Daniells	do	do	131	274	0.97	267
Sept. 26	G. J. Smith	do	N.W. 3-54-16-5	260	446	1.23	550
Oct. 10	P. H. Daniells	do	do	218	387	1.27	493
" 22	do	do	do	248	316	1.17	448
Nov 7	do	do	do	243	354	1.24	440
" 20	do	do	do	217	362	0.65	237
Dec. 17	do	do	do	227	232	0.72	167
Feb. 20	V. Meek,	Pembina River	S.W. 20-53-7-5	30	32	1.68	53
Mar. 14	do	do	do	34	35	2.02	70
Nov. 19	P. H. Daniells	do	do	123	263	0.29	77
July 26	G. J. Smith	Prairie Creek	N.E. 5-51-25-5	18	16	1.50	23
Aug. 16	do	do	do	21	26	2.58	67
" 30	do	do	do	18	15	1.38	21
Sept. 15	do	do	do	16	11	1.18	16
" 27	do	do	do	16	13	0.92	12
Oct. 7	A. Tallentine	do	do	16	11	0.87	12
" 23	P. H. Daniells	do	do	16	13	1.03	14
Nov. 9	do	do	do	14	9	1.70	15
" 22	do	do	do	8	6	0.48	3

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Athabasca River drainage basin, in 1913.—(Continued).

Date	Hydrographer.	Stream.	Location	Width.	Area of Section.	Mean Velocity.	Discharge.
Sept. 16....	A. Tallentine ...	Snaring River.....	N.W. 33-46-1-6..	167	173	3 52	608
Oct. 5....	P. H. Daniells ..	do	do ..	74	144	1 41	202
" 28....	do	do	do ..	71	132	1.16	154
Nov. 12....	do	do	do ..	70	126	0.73	93
" 27....	do	do	do ..	90	159	0.70	112
Dec. 12....	do	do	do ..	85	123	0 76	93
Feb. 15....	V. Meek	Stony River.....	48-28-5.....	30	43	3.94	170
Mar. 10....	do	do	do ..	31	60	3.01	181
Apr. 9....	do	do	do ..	29	53	3.28	175
" 30....	do	do	do ..	64	111	1.67	186
May 19....	J. S. Wright	do	do ..	84	142	2 69	380
July 25....	G. J. Smith.....	Sundance Creek...	N.W. 4-53-18-5 .	26	37	1 31	49
Aug. 11....	do	do	do ..	27	36	1 26	45
Sept. 12....	do	do	do ..	28	32	0.91	30
" 25....	do	do	do ..	27	32	1.00	32
Oct. 8....	do	do	do ..	28	29	0.94	27
Oct. 21....	P. H. Daniells ..	do	do ..	25	31	0.99	31
Nov. 5....	do	do	do ..	28	31.	0.81	26
Aug. 14....	G. J. Smith.....	Wolf Creek.....	S.W. 3-54-16-5..	74	120	3.13	377
" 27....	do	do	do ..	49	52	2.11	112
Sept. 10....	do	do	do ..	43	34	1 59	54
Oct. 10....	P. H. Daniells ..	do	do ..	46	37	1.34	49

NORTH SASKATCHEWAN DRAINAGE BASIN.

General Description.

The North Saskatchewan River draws its principal water supply from the eastern slope of the Rocky mountains. The basin is bounded on the south by those of the Red Deer and South Saskatchewan Rivers and on the north by those of the Athabasca and Churchill Rivers. The general trend of the stream from its source to where it joins the South Saskatchewan, a few miles below the City of Prince Albert, and forms the Saskatchetwan River, is easterly.

The basin of the river easily divides itself into five parts or divisions, each of which requires a separate des ription to enable one to understand clearly the conditions of run-off.

The first or upper section consists of the eastern slope of the Rocky mountains. While this part of the basin is not the greatest in area it supplies the greater part of the run-off. In glaciers and the perpetual snows of the higher peaks, innumerable small streams rise, which form the main stream and its larger tributaries. These streams have well defined rocky valleys and considerable fall. The upper regions of this section are not well wooded and allow of a rapid run-off of melting snows or rains.

East of this first section is a division which consists of the foothills which are for the most part well covered with forest and vegetable growth and forms probably the largest in area of the five sections. Here also is a very large source of supply for the stream but due to its cover it is a more regulated supply than the first section. In this section the main stream is joined by the Clearwater and Brazeau Rivers, two of the most important tributaries of the whole river basin. The streams in this section flow through deep valleys with fairly permanent beds and medium slopes.

From a little west of the City of Edmonton to the mouth of the Vermilion River the country is of a parklike nature with large stretches of prairie. This section is small in area and has not a very large run-off. The principal tributaries are the Sturgeon and Vermilion Rivers, the first of which drains in from the wooded country of the north, the latter from the prairie sections of the south. The main stream is in a well defined valley with large flats along its course and a more or less permanent bed with a small slope.

Below the third section to a little above the City of Prince Albert is a division which has little drainage into the river. It consists of prairie uplands for the most part, with small patches of timber to the north. The stream widens out into shallow reaches full of shifting sand bars and has very little slope. The valley while still well defined is also much wider. In this section the main stream is fed by the Battle River, which heads in Battle Lake, and flows eastward through park land and prairie sections south of the main river until it empties into it at the town of Battleford.

The last division is one in which the river with a greater slope and more permanent bed narrows considerably, as does also the valley. The run-off in this division is mostly from the north, which consists of well wooded country drained by a number of small streams.

During 1913, stations were established on the Sturgeon River at St. Albert and on the Battle River at Ponoka, and cables, were erected on the main river and on the Clearwater River near Rocky Mountain House; the latter will enable us to obtain records at these points during 1914.

A description of flood conditions in this basin may be found on pages 30 and 31 in the Report of the Progress of Stream Measurements for 1912.

NORTH SASKATCHEWAN RIVER AT PRINCE ALBERT.

This station was established October 2, 1911, by J. C. Keith. It is located at the Canadian Northern Railway and traffic bridge in the city of Prince Albert on river lot No.76 Prince Albert Settlement.

The gauge is of the standard chain type reading to feet and hundredths. The zero of the gauge (elev. 1456.097) is referred to a permanent Public Works Department of Canada bench mark(assumed elev.1489.202 Public Works Department=elev.1403.502 above mean sea level, Topographical Surveys Branch 1913,) located on the top of the right abutment on its downstream side and marked "P.W.D.B.M. 176". The gauge is situated in the second span from the right bank on the downstream side of the railway bridge; the length of chain from the bottom of the weight to the marked is 40.41 feet.

The channel is straight for about 1000 feet above and 800 feet below the station. Both banks are high and will not overflow in ordinary floods. The bed is composed of coarse gravel and boulders with a silting of sand near the piers.

Discharge measurements are made from the downstream side of the bridge, which is a seven-span steel swing structure on cement piers and abutments. The initial point for soundings is 25 feet north of the iron post at the end of the handrail of the bridge on the downstream side, and is suitable marked on the guard rail of the bridge.

During 1913, the gauge was read by W. Moodie, J. A. Fox, and W. H. Storey.

Owing to a request by the City of Prince Albert and the Water Powers Branch of this department, a resident hydrographer was employed to make measurement three times a week through the winter season of 1913-1914; therefore the estimates for the period December 8th to 31st are of a high degree of accuracy.

DISCHARGE MEASUREMENTS of North Saskatchewan River at Prince Albert, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	Ft. per sec	*Feet.*	*Sec.-ft.*
Jan. 4 *a*	O. H. Hoover	630	2,378	0.98	4.52	2,382
Jan. 31 *a*	do	709	1,758	0.78	4.07	1,370
Mar. 1 *a*	do	690	1,749	0.95	4.55	1,650
April 24	do	935	8,727	3.72	10.48	32,451
May 21-22	do	878	5,975	2.49	6.82	14,932
June 12	do	910	6,623	2.52	7.55	16,717
July 14	do	918	7,171	3.21	8.44	22,900
Aug. 14	do	899	6,809	2 93	8.17	19,986
Sept. 13	do	879	5,663	2 52	6.90	14,246
Oct. 10	do	870	4,176	1 78	5 20	7,444
Nov. 3	do	745	2,965	1.34	3.76	3,974
Nov. 29 *a*	do	734	2,456	1.08	4.26	2,676
Dec. 8 9 *a*	W. H. Storey	730	2,091	0.83	3 67	1,737
Dec. 12-13 *a*	do	640	2,800	0.55	3 65	1,536
Dec. 15-16 *a*	do	640	2,859	0.57	3.78	1,631
Dec. 17 *a*	do	640	3,004	0.68	1 05	2,037
Dec. 19 *a*	do	640	2,938	0.64	1 01	1,895
Dec. 22 *a*	do	640	2,824	0.59	3.93	1,662
Dec. 24 *a*	do	600	2,798	0.59	3.97	1,641
Dec. 26 *a*	do	600	2,730	0.57	3 96	1,550
Dec. 29 *a*	do	600	2,632	0.53	3.87	1,394
Dec. 31 *a*	do	600	2,606	0.53	3.90	1,389

a Ice conditions.

Daily Gauge Height and Discharge of North Saskatchewan River at Prince Albert, for 1913

Day.	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec-ft..*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	4.44	2,500*a*	4.09	1,376	4.55	1,650	4.94	2,400	7.80	18,600	6.77	13,865
2	4.44	2,500	4.09	1,375	4.64	1,675	4.89	2,425	7.28	16,160	6.82	14,090
3	4.60	2,675	4.14	1,400	4.66	1,750	4.94	2,425	6.93	14,585	6.77	13,865
4	4.43	2,525	4.09	1,400	4.64	1,750	4.99	2,500	6.70	13,550	6.79	13,955
5	4.19	2,100	4.25	1,475	4.64	1,750	5.04	2,700	6.45	12,500	7.04	15,080
6	3.95	1,675	4.24	1,475	4.66	1,760	5.29	5,000*a*	6.28	11,820	7.22	15,890
7	4.04	1,875	4.29	1,525	4.69	1,825	5.54	9,040	6.11	11,140	7.48	17,060
8	4.28	2,125	4.34	1,550	4.68	1,850	5.84	10,090	5.99	10,660	7.60	17,600
9	4.24	2,000	4.34	1,550	4.66	1,825	5.99	10,660	5.82	10,020	7.55	17,375
10	3.95	1,500	4.38	1,550	4.68	1,800	6.39	12,260	5.69	9,565	7.55	17,375
11	4.09	1,600	4.34	1,525	4.70	1,830	6.93	14,585	5.51	8,935	7.55	17,375
12	4.09	1,625	4.38	1,550	4.69	1,840	7.15	15,575	5.42	8,620	7.58	17,510
13	4.14	1,650	4.42	1,575	4.69	1,850	7.38	16,610	5.34	8,340	7.67	17,950
14	3.95	1,500	4.46	1,600	4.67	1,825	8.13	20,250	5.34	8,340	7.88	19,000
15	3.90	1,350	4.50	1,600	4.67	1,800	8.40	21,600	5.34	8,340	7.75	18,350
16	4.00	1,400	4.50	1,625	4.67	1,800	8.12	20,200	5.24	8,020	7.55	17,375
17	4.14	1,540	4.57	1,650	4.68	1,825	7.74	18,300	5.17	7,810	7.82	18,700
18	4.14	1,525	4.64	1,700	4.70	1,850	7.39	16,655	5.16	7,780	8.50	22,100
19	4.04	1,375	4.62	1,725	4.73	1,870	7.38	16,610	5.14	7,720	9.08	25,000
20	4.07	1,350	4.60	1,725	4.73	1,875	7.16	15,620	5.24	8,020	9.09	25,050
21	4.09	1,375	4.65	1,725	4.76	1,925	7.10	15,350	6.12	11,180	8.92	24,200
22	4.09	1,400	4.51	1,650	4.76	2,050	10.28	31,540	7.14	15,530	8.92	24,200
23	4.09	1,400	4.56	1,660	4.83	2,150	10.65	33,575	7.28	16,166	8.79	23,550
24	4.06	1,375	4.62	1,700	4.90	2,275	10.08	30,440	7.34	16,430	8.42	21,700
25	4.09	1,390	4.60	1,675	4.98	2,375	9.56	27,580	7.22	15,890	8.02	19,700
26	4.02	1,350	4.56	1,675	4.98	2,425	9.10	25,100	7.30	16,250	7.60	17,600
27	4.04	1,350	4.56	1,650	5.08	2,500	8.82	23,700	7.34	16,430	7.27	16,115
28	4.06	1,375	4.55	1,650	5.04	2,450	8.72	23,200	7.22	15,890	7.70	18,100
29	4.09	1,400	.....	.....	5.02	2,450	8.64	22,800	7.00	14,900	8.87	23,950
30	4.05	1,375	.....	.....	4.98	2,425	8.30	21,100	6.75	13,775	9.56	27,580
31	4.05	1,370	.....	.....	4.99	2,400	.....	.....	6.72	13,640	.....	.....

a Ice conditions from Jan. 1st to April 6th.

Daily Gauge Height and Discharge of North Saskatchewan River at Prince Albert, for 1913.—*Concluded.*

Day	July		August		September		October		November		December	
	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge	Gauge Height	Discharge
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	9.08	25,000	9.70	28,350	7.53	17,285	5.72	9,670	3.66	3,600	4.15	2,600
2	8.66	22,900	9.50	27,250	7.66	17,900	5.66	9,460	3.64	3,550	4.15	2,400
3	9.06	24,900	9.52	27,360	7.75	18,350	5.58	9,180	3.77	3,875	4.08	2,350
4	10.08	30,440	9.29	26,095	7.78	18,500	5.48	8,830	3.96	4,350	4.05	2,300
5	10.28	31,540	8.96	24,400	7.75	18,350	5.39	8,515	4.12	4,750	4.03	2,300
6	10.44	32,420	8.82	23,700	7.70	18,100	5.30	8,200	4.27	5,125*c*	4.03	2,300
7	10.21	31,155	8.73	23,250	7.57	17,465	5.23	7,990	4.38	4,000*a*	4.02	2,250
8	9.86	29,230	8.44	21,800	7.78	18,500	5.20	7,900	4.38*b*	2,750	3.84	2,000
9	9.73	28,515	8.08	20,000	7.85	18,850	5.18	7,840	4.37*b*	2,750	3.75	1,737
10	9.54	27,470	8.02	19,700	7.86	18,900	5.18	7,840	4.37*b*	2,725	3.68	1,650
11	9.26	25,930	8.16	20,400	7.51	17,195	5.15	7,750	4.36*b*	2,725	3.66	1,600
12	9.52	27,360	8.42	21,700	7.04	15,080	5.18	7 840	4.36*b*	2,725	3.66	1,575
13	8.75	23,350	8.52	22,200	6.88	14,360	5.20	7,900	4.35*b*	2,700	3.65	1,536
14	8.98	22,000	8.59	22,550	7.08	15,260	5.22	7,960	4.35*b*	2,675	3.66	1,575
15	8.36	21,400	8.64	22,800	7.22	15,890	5.18	7,840	4.34*b*	2,650	3.78	1,600
16	8.86	23,900	8 68	23,000	7.00	14,900	5.12	7,660	4.34*b*	2,650	3.91	1,634
17	8.86	23,900	9.68	28,240	6.70	13,550	4.99	7,270	4.33*b*	2,675	4.05	1,950
18	8.58	22,500	10.25	31,375	6.58	13,020	4.90	7,000	4.33*b*	2,675	4.06	2,050
19	8.48	22,000	10.00	30,000	6.62	13,190	4.84	6,820	4.32*b*	2,625	4.01	1,950
20	8.55	22,350	10.28	31,540	6.68	13,460	4.81	6,730	4.32*b*	2,600	3.93	1,825
21	9.22	25,710	11.03	35,665	6.45	12,500	4.74	6,520	4.31*b*	2,650	3.89	1,725
22	10.58	33,190	10.99	35,445	6.28	11,820	4.68	6,340	4.31*b*	2,650	3.93	1,675
23	10.28	31,540	10.45	32,475	6.15	11,300	4.70	6,400	4.30*b*	2,650	3.99	1,675
24	9.58	27,690	9.84	29,120	6.15	11,340	4.70	6,400	4.30*b*	2,625	3.97	1,650
25	9.07	24,950	9.32	26,260	6.10	11,100	4.72	6,460	4.30*b*	2,625	3.99	1,625
26	8.66	22,900	8.96	24,400	5.98	10,620	4.61	6,130	4.29*b*	2,650	3.96	1,580
27	8.52	22,200	8.60	22,600	5.88	10,230	4.30	5,200	4.29	2,650	3.90	1,575
28	8.57	22,450	8.26	20,900	5.86	10,160	4.10	4,700	4.33	2,675	3.87	1,500
29	8.95	24,350	7.98	19,500	5.85	10,125	3.93	4,275	4.33	2,675	3.87	1,440
30	9.72	28,460	7.70	18,100	5.81	9,985	3.80	3,950	4.30	2,650	3.87	1,400
31	10.01	30,055	7.64	17,800	.....	.....	3.80	3,950	.....	.....	3.90	1,375

b Interpolated.
c Ice conditions from Nov. 6 to Dec. 31.

Monthly Discharge of North Saskatchewan River at Prince Albert, for 1913.

(Drainage area (*a*) square miles)

Month.	Discharge in Second Feet.			Run-off.
	Maximum	Minimum	Mean.	Total in acre-ft.
January	2,675	1,350	1,663	102,254
February	1,725	1,375	1,583	87,915
March	2,500	1,650	1,981	121,807
April	33,575	2,400	16,330	971,702
May	18,600	7,720	12,149	747,013
June	27,580	13,865	19,042	1,133,078
July	33,190	21,400	26,186	1,610,114
August	35,665	17,800	25,096	1,543,093
September	18,900	9,985	14,576	867,332
October	9,670	3,950	7,114	437,423
November	5,125	2,600	3,022	179,821
December	2,600	1,375	1,819	111,846
The year	.....	.....	.....	7,913,398

a The results obtained from the drainage area would be misleading; thus no results involving the drainage area were computed.

Daily Gauge Height and Discharge of North Saskatchewan River at Prince Albert, for 1910

Day.	June		July		August		September		October	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1			7.67	15,916	8.12	18,100	7.42	14,752	6.52	10,982
2			7.27	14,062	7.87	16,876	7.22	13,832		
3			6.92	12,504	7.92	17,116	6.92	12,504		
4			6.97	12,714	7.17	13,602	6.77	11,906		
5			7.02	12,928	6.87	12,300	6.52	10,982		
6			7.82	16,636	6.77	11,906	6.57	11,162		
7			7.87	16,876	6.57	11,162	6.62	11,342		
8			8.07	17,850	6.47	10,805	6.72	11,716	5.77	8,355
9			7.87	16,876	6.57	11,162	6.72	11,716	5.67	8,005
10			7.67	15,916	6.62	11,342	6.52	10,982	5.57	7,655
11			8.07	17,850	6.82	12,100	6.47	10,805	5.47	7,308
12			7.32	14,292	6.62	11,342	6.42	10,630	5.42	7,138
13			7.17	13,602	6.42	10,630	6.42	10,630	5.27	6,644
14			7.12	13,372	6.52	10,982	7.32	14,292	5.22	6,484
15			6.92	12,504	6.62	11,342	8.12	18,100	5.22	6,484
16			6.82	12,100	6.82	12,100	8.52	20,100	5.12	6,172
17			7.07	13,148	7.12	13,372	8.17	18,350	5.17	6,327
18			7.02	12,928	7.12	13,372	7.82	16,636	5.22	6,484
19			6.82	12,100	7.17	13,602	7.47	14,982	5.27	6,644
20			7.22	13,832	7.42	14,752	7.17	13,692	5.67	8,005
21			7.32	14,292	7.52	15,212	6.97	12,714	6.02	9,230
22	9.27	23,985	7.57	15,422	7.57	15,442	6.57	11,162	6.02	9,230
23	7.72	16,156	8.02	17,600	7.77	16,396	6.47	10,805	5.97	9,055
24	7.27	14,062	7.97	17,356	8.22	18,600	6.37	10,455	5.82	8,530
25	7.07	13,148	7.87	16,876	8.17	18,350	6.42	10,630	5.82	8,530
26	7.42	14,752	7.92	17,116	7.87	16,876	6.47	10,805	5.92	8,880
27	8.17	18,350	8.22	18,600	7.77	16,396	6.52	10,982	6.07	9,405
28	7.82	16,636	8.12	18,100	7.42	14,752	6.47	10,805	6.22	9,930
29	7.67	15,916	8.07	17,850	7.17	13,602	6.42	10,630	6.12	9,580
30	7.77	16,396	7.87	16,876	7.12	13,372	6.32	10,280	5.92	8,880
31			8.02	17,600	7.27	14,062			5.97	9,055

Note.—Gauge heights supplied by Dep. of Public Works, Canada.

Daily Gauge Height and Discharge of North Saskatchewan River at Prince Albert, for 1911.—*Concluded.*

Day	May		June		July		August		September		October	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1			6 40	10,560	8 0	17,500	10 9	34,200	9 6	25,800	6 35	10,385
2			6 20	9,860	9 0	22,500	10 5	31,400	9 5	25,250	6 30	10,210
3			6 10	9,510	9 95	27,800	10 0	28,100	9 4	24,700	6 25	10,025
4			6 10	9,510	9 80	26,900	9 8	26,900	9 1	23,050	6 20	9,860
5			6 10	9,510	9 3	24,150	9 6	25,800	8 85	21,750	6 15	9,685
6			5 80	8,460	9 75	26,625	9 2	23,600	8 65	20,750	6 10	9,510
7			5 80	8,460	9 25	23,875	9 1	23,050	8 45	19,750	6 10	9,510
8	5 8	8,460	6 20	9,860	9 60	25,800	9 0	22,500	8 40	19,500	6 05	9,335
9	5 55	7,585	7 40	14,600	8 90	22,000	9 0	22,500	8 40	19,500	6 00	9,160
10	5 55	7,585	8 30	19,600	12 00	42,260	9 0	22,500	8 30	19,000	5 90	8,810
11	5 50	7,410	8 5	20,000	11 0	34,900	9 1	23,050	8 25	18,750	5 85	8,635
12	5 50	7,410	8 5	20,000	10 8	33,500	9 1	23,050	8 25	18,750	5 80	8,460
13	5 45	7,240	7 3	14,200	10 1	28,700	9 3	24,150	8 35	19,250	5 80	8,460
14	5 40	7,070	7 4	14,660	9 65	26,075	9 9	27,500	8 20	18,500	5 80	8,460
15	5 50	7,410	7 1	13,280	9 8	26,900	9 9	27,500	7 75	16,300	5 70	8,110
16	6 00	9,160	6 8	12,020	10 0	28,100	9 8	26,900	7 35	14,430	5 60	7,760
17	6 30	10,210	6 6	11,270	9 7	26,350	9 9	27,500	7 30	14,200	5 55	7,585
18	6 20	9,860	6 6	11,270	9 3	24,150	9 8	26,900	7 15	13,510	5 40	7,070
19	6 10	9,510	6 7	11,640	9 1	23,050	9 7	26,350	7 10	13,280	5 35	6,905
20	6 15	9,685	6 6	11,270	8 9	22,000	9 5	25,250	6 95	12,630	5 30	6,740
21	6 15	9,685	6 6	11,270	8 7	21,000	9 2	23,600	6 85	12,200	5 25	6,580
22	6 00	9,160	8 9	22,000	8 5	20,000	8 9	22,000	6 80	12,220	5 20	6,420
23	5 75	8,285	8 9	22,000	8 2	18,500	8 6	20,500	6 80	12,020	5 29	6,420
24	5 60	7,760	8 9	22,000	8 1	19,500	8 1	19,500	6 80	12,020	5 10	6,110
25	6 10	9,510	8 9	22,000	9 1	23,050	8 2	18,500	6 70	11,640	5 10	6,110
26	6 95	12,630	8 9	22,000	9 60	25,800	8 2	18,500	6 60	11,270	5 05	5,960
27	7 25	13,970	8 8	21,500	9 55	25,525	9 8	26,900	6 60	11,270	5 00	5,810
28	7 90	17,020	8 3	19,000	9 60	25,800	9 5	25,250	6 55	11,090	4 95	5,665
29	7 45	14,890	8 1	18,000	9 90	27,500	11 9	41,400	6 35	10,385	4 85	5,380
30	7 00	12,840	7 7	16,060	10 40	30,700	10 8	33,500	6 40	10,560		
31	6 60	11,270			10 90	34,200	9 95	27,800				

Not .—Gauge heights supplied by Dep. of Public Works, Canada.

Monthly Discharge of North Saskatchewan River at Prince Albert, for 1910-11.

Month.	Discharge in Second-feet.			Run-Off.
	Maximum.	Minimum.	Mean.	Total in Acre-feet.
1910				
June (22-30)	23,985	13,148	16,600	296,333
July	18,600	12,100	15,346	943,589
August	18,600	10,630	13,904	854,924
September	20,100	10,280	12,609	750,288
October (1, 8, 31)	10,982	6,172	8,120	102,629
The period				3,247,763
1911				
May (8-31)	17,020	7,070	9,817	467,336
June	22,000	8,460	14,828	882,327
July	42,200	17,500	25,956	1,595,972
August	41,400	18,500	25,682	1,579,125
September	25,800	10,385	16,438	978,179
October (1-29)	10,385	5,380	7,902	454,529
The period				5,957,468

NORTH SASKATCHEWAN RIVER AT BATTLEFORD.

This station was established May 16, 1911, by H. R. Carscallen. It is located at the traffic bridge in the town of Battleford, on the N.E. ¼ Sec. 29, and the S. W. ¼ Sec. 33, Tp. 43, Rge. 16, W. 3rd Mer. A large island in the river at this point divides the stream into two channels and the river is spanned by two steel bridges, one over each channel. The bridge over the north channel is a five-span steel structure on cement piers and abutments; the south bridge is a three-span steel structure on cement piers and abutments. The two channels necessitate the existence of two gauges, one in each channel.

The gauge in the north channel is of the standard chain type, located on the floor of the bridge at the centre of the left span. The zero of the gauge (elev. 81.90) is referred to a bench mark (elev. 95.26) on the downstream side of the left abutment, marked D.I.; this is referred to a permanent iron bench mark (assumed elev. 100.00) used for the south channel.

The gauge in the south channel is of the standard chain type located on the floor of the bridge at the centre of the right span. The zero of the gauge (elev. 81.16) is referred to a permanent iron bench mark (assumed elev. 100.00, located on the right bank 200 feet south-east of the right abutment.

The north channel is straight for about 1500 feet above and 1200 feet below the station The right bank is high, gravelly and free from brush. The left bank is comparatively low, wooded and will overflow at high stages. The bed of the stream is very sandy and shifts continually. Numerous sand bars appear in the channel at low stages of the stream.

The south channel is straight for about 1500 feet above and 600 feet below the station. The left bank is comparatively low, wooded and will overflow at high stages. The right bank is higher. wooded and not liable to overflow. The bed of the stream is composed of sand and gravel and will shift.

Discharge measurements are made from the downstream side of the bridges. The initial point for soundings for each channel is the north end of the handrail on the downstream side of the bridge and distances are marked every ten feet on the handrail.

During 1913 gauge height observations were made by H. W. Fisher.

DISCHARGE MEASUREMENTS of North Channel of North Saskatchewan River, at Battleford, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 10	O. H. Hoover	230	340	0.59	3.05	200
Feb. 7	do	97	293	0.68	3.61	191
Mar. 10	do	.....	.....	.....	.....	.....*a*
April 18	do	624	1,968	2.13	4.175	4,195
May 16	do	379	1,109	1.89	2.97	2,098
June 23	do	875	3,357	2.37	5.66	7,973
July 17	do	1062	4,318	2.33	6.36	10,055
July 21	do	1096	5,484	2.45	7.45	13,439
Aug. 15	do	1174	5,405	3.11	8.19	16,820
Sept. 16	do	711	2,391	2.39	4.62	5,724
Oct. 14	do	470	1,365	1.81	3.23	2,475
Nov. 6	do	207	873	1.47	2.89	1,286
Nov. 25	do	324	1,050	1.29	3.39	1,350
Dec. 16	F. R. Steinberger	225	838	0.63	3.02	527

a Water on ice.

Daily Gauge Height and Discharge of North Channel of North Saskatchewan River, at Battleford, for 1913.

Day	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	3.10*b*	300	3.40	350	3 95	460	4.15	720	4.25	4.340	4.97	6,069
2	3.10	280	3.50	460	3 97	580	4.00	700	4.10	4,040	4.99	6.123
3	3.10	270	3 65	570	3 97	600	3.85	670	3.91	3,660	5.28	6.906
4	3.10	250	3.65	590	3.98	600	4.00	670	3.85	3.550	5.69	8,052
5	3.10	250	3.50	540	3.80	530	4.07	750	3.50	2,920	5.67	7,996
6	3.10	230	3.40	340	3.80	490	4.08	800	3.46	2,856	5.67	7,996
7	3.10	230	3.20	210	3.81	520	4.10	810	3.41	2,776	5.69	8.052
8	3.10	230	3.00	180	3.95	600	4.20	820	3.35	2,680	5.68	8,024
9	3.10	220	2.98	180	3.95	630	4.78	1,080	3.30	2,600	5.69	8,052
10	3.10	210	2.98	200	4.00	630	4.92	1,610	3.28	2,568	5.75	8,230
11	3.10	190	3.00	200	4.00	640	5.15	1,700	3.20	2,440	5.97	8,890
12	3.10	210	3.00	200	4.00	640	5.34	1,870	3.14	2,440	5.95	8.830
13	3.10	230	3.05	210	4.00	650	4.78	1,980	3.09	2,266	5 76	8,260
14	3.10	250	3.10	210	4 05	670	4.80	2,140	3.05	2,200	6.00	8,980
15	3.10	250	3.25	270	4 05	670	5.15	6,555*b*	3.00	2,140	6.33	9,970
16	3.10	250	3.40	340	4.05	680	5.15	6,555	2.97	2,089	7.14	12,744
17	3.10	240	3.50	430	4.15	720	4.55	7,660	3.03	2,182	10.79	27,210
18	3.10	220	3.55	480	4.20	780	4.36	4,584	5.24	6,798	10.70	26,850
19	3.10	210	3.55	490	4.25	810	4.11	4,060	5.24	6,793	6.92	11,952
20	3.07	200	3.55	480	4.25	810	8.60	18,450	5.29	6,933	6.89	11,846
21	3.05	150	3.60	510	4.29	840	7.45	13,895	5.32	7,016	6 84	11,676
22	3.10	210	3.60	510	4.39	890	6.99	12,204	5.26	6,852	6 40	10,180
23	3.10	230	3.60	510	4.40	890	7.04*a*	12,384	5.29	6.933	5.89	8,650
24	3.10	230	3.60	510	4.40	890	7.10	12,600	5.22	6,744	5 49	7,492
25	3.10	210	3.60	500	4.37	890	6.17	9,490	5.13	6,501	5 55	7,660
26	3.13	210	3.65	500	4.30	820	6 15	9,430	5.00	6,150	6 00	8,980
27	3.15	250	3.65	500	4.20	760	5 69	8,052	4.86	5,784	6 89	11,846
28	3.15	250	3.70	480	4.16	750	5.41	7,268	4.96	6,042	6 91	11,916
29	3.15	220	.....	.....	4 14	720	4 90	5,880	4.95	6,015	6 85	11,710
30	3.20	210	.....	.....	4.16	710	4.49	4,896	4.99	6,123	6 88	11,812
31	3.25	270	.....	.....	4.15	710	.....	.....	4.97	6,069	.....	.....

a Interpolated.
b Ice conditions from Jan. 1st to April 15.

Daily Gauge Height and Discharge of North Channel of North Saskatchewan River at Battleford, for 1913.—Concluded.

Day	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	6.93	11,988	6.39	10,150	5.69	8,052	3.75	3,370	3.98	3,800	2 97	1,200
2	7.19	12,924	6.39	10,150	5.67	7,996	3.53	2,974	4 32	4,488	2 82	1,050
3	8.34	17,410	6.41	10,214	5.67	7,996	3.61	3,118	4.17	4,180	2.77	880
4	8.08	16,370	6.57	10,857	5.62	7,856	3.55	3,010	3.98	3,800	2 75	640
5	7.73	14,987	6.31	9,910	5.58	7,744	3.47	2,872	3.72	3,316	2.72	570
6	7.69	14,831	7.25	13,140	5.46	7,408	3.47	2,872	2.89	1,286*a*	2 69	500
7	7.42	13,778	7.20	12,960	5.42	7,296	3.46	2,856	2.82	1,300	2 69	470
8	6.99	12,204	7.19	12,924	5 42	7,296	3.46	2,856	2.82	1,300	2 77	470
9	6.62	10,928	7.00	12,240	5.11	6,447	3.42	2,792	2.77	1,290	2 85	410
10	6.41	10,214	6.99	12,204	4.81	5,664	3.48	2,888	2.77	1,290	2 92	420
11	6.41	10,214	6.71	11,234	5 23	6,771	3 62	3,136	2.73	1,280	3 00	460
12	6.47	10,418	6.36	10,060	5.20	6,690,	3.57	3,046	2 72	1,270	3 09	490
13	6.46	10,384	6.17	9,490	4.71	5,424	3 38	2,728	2 77	1,280	3 12	510
14	6.46	10,384	5.98	8,924	4 65	5,280	3.31	2,616	2 97	1,290	3 14	550
15	6.44	10,316	7.76	15,104	4 58	5,112,	3 24	2,504	3 37	1,370	3 14	580
16	6.41	10,214	7.52	14,168	4 51	4,944	3.21	2,456	3.47	1,440	3 17	570
17	6.39	10,150	7.62	14,558	4.27	4,380	3 17	2,392	3.51	1,490	3 16	540
18	6.44	10,316	7 75	15,065	4.25	4,340	3 17	2,392	3 52	1,490	3 16	540
19	6 54	10,656	7.96	15,890	4 22	4,280	3 12	2,312	3 52	1,490	3 12	520
20	6.29	9,850	7.96	15,890	4 20	4,240	3.10	2,280	3 52	1,480	3 08	480
21	7.77	15,143	7.69	14,831	4.20	4,240	3.07	2,238	3 52	1,470	3 07	420
22	7.76	15,104	7.12	12,672	4 17	4,180	3 06	2,224	3 52	1,470	3 07	390
23	7.62	14,558	6.75	11,370	4.12	4,080	3.02	2,168	3 52	1,470	3 07	390
24	7.80	15,260	6.59	10,826	4 06	3,960	2.97	2,098	3.52	1,460	3.07	350
25	7.85	15,455	6.06	9,160	4.09	4,020	2 97	2,098	3 39	1,370	3.10	350
26	7.79	15,221	6.04	9,100	4.08	4,000	2 98	2,112	3 12	1,370	3 10	350
27	7.73	14,987	5.86	8,560	4.03	3,900	2 97	2,098	3 13	1,490	3.15	350
28	7.09	12,564	5.85	8,530	3.87	3,586	2 97	2,098	3 87	1,540	3.14	370
29	6.41	10,214	5.80	8,380	3 87	3,586	2.97	2,098	2.97	1,370	3.09	390
30	6 41	10,214	5.79	8,350	3 78	3,424	2 93	2,042	3.02	1,300	3 07	390
31	6.40	10,180	5.68	8,024	....	....	2 92	2,028	.....	.....	3 02	380*a*

a Ice conditions from Nov. 6 to Dec. 31.

Monthly Discharge of North Channel of North Saskatchewan River at Battleford, for 1913.

Month.	Discharge in Second-Feet.			Run-off.
	Maximum.	Minimum.	Mean.	Total in acre-feet.
January	300	150	231	14,204
February	590	180	391	21,715
March	890	469	696	42,795
April	18,450	600	5,343	317,931
May	7,016	2,098	4,465	274,542
June	27,210	6,069	10,431	620,687
July	17,410	9,850	12,498	768,472
August	15,890	8,020	11,449	703,972
September	8,052	3,424	5,473	325,666
October	3,370	2,028	2,541	156,240
November	4,488	1,270	1,808	107,583
December	1,200	350	512	31,482
The year				3,385,289

Discharge Measurements of South Channel of North Saskatchewan River at Battleford, in 1913.

Date.	Hydrographer.	Width.	Area of Section	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 10	O. H. Hoover	154	968	0.82	4 29	793
Feb. 7	do	159	895	1 36	4 89	1,096
Mar. 10	do	157	704	1.50	5 00	1,164
April 19	do	229	1,387	3.65	5 90	5,060
May 17	do	311	1,399	2 44	4 18	3,407
June 6	do	472	2,952	2 53	6 23	7,479
July 18	do	505	3,448	2 70	7 25	9,312
July 21	do	519	3,890	2 55	8 10	9,931
Aug. 16	do	521	4,297	2 92	8 42	12,550
Sept. 17	do	455	2,695	2.28	5 64	6,149
Oct. 15	do	314	1,752	2.32	4 22	4,076
Nov. 7	do	314	1,646	1.21	4 20	1,995
Nov. 26	do	310	1,168	1.92	3.15	1,081
Dec. 17	F. R. Steinberger	310	1,105	1.63	3 98	1,803

Daily Gauge Height and Discharge of South Channel of North Saskatchewan River at Battleford, for 1913.

Day	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	4.30	1,350*b*	4.60	1,060	5.17	1,110	5.18	1,280	5.10	5,170	5.76	6,384
2	4.25	1,280	4.60	1,100	5.17	1,120	5.17	1,280	4.97	4,936	5.78	6,422
3	4.25	1,230	4.70	1,160	5.17	1,120	5.15	1,280	4.78	4,594	6.11	7,070
4	4.25	1,140	4.75	1,200	5.17	1,080	5.15	1,280	4.74	4,540	6.50	7,870
5	4.30	1,000	4.75	1,220	5.15	1,080	5.14	1,270	4.70	4,450	6.47	7,807
6	4.45	950	4.75	1,200	5.15	1,080	5.14	1,270	4.48	4,120	6.47	7,807
7	4.39	920	4.70	1,120	5.19	1,080	5.15	1,300	4.29	3,836	6.50	7,870
8	4.45	930	4.60	1,060	5.19	1,090	5.31	1,500	4.20	3,710	6.49	7,849
9	4 49	920	4.70	1,110	5.20	1,130	5.60	1,640	4.17	3,671	6.50	7,870
10	4.50	850	4.80	1,170	5.25	1,170	5.73	1,710	4.15	3,645	6.58	8,038
11	4.50	820	4.90	1,270	5.35	1,190	5.80	1,800	4.10	3,580	6.84	8,622
12	4.50	870	4.95	1,310	5.35	1,220	5.92	1,880	4.00	3,450	6.80	8,530
13	4.50	900	4.95	1,350	5.35	1,220	6.19	1,990	4.09	3,567	6 63	8,146
14	4.50	930	4.97	1,350	5.35	1,220	6.19	2,030	4.05	3,515	6.67	8,234
15	4.50	950	4.97	1,340	5.35	1,230	6.19	2,030	3.95	3,390	7.00	8,990
16	4.50	950	4.97	1,280	5 36	1,270	6.20	2,030*b*	3.88	3,306	7.85	11,055
17	4.50	960	4.90	1,220	5.46	1,310	5.48	5,854	4.05	3,515	11.50	21,002
18	4.48	960	4.90	1,150	5.50	1,400	5 19	5,332	6 05	6,950	11 42	20,796
19	4.47	960	4.85	1,120	5 56	1,420	4.98	3,620	6.08	7,010	7.65	10,555
20	4.45	970	4.85	1,080	5.56	1,440	9.37	12,980	6.22	7,290	7.61	10,455
21	4.45	970	4.90	1,060	5.60	1,460	8.36	10,560	6.13	7,310	7.58	10,380
22	4.45	970	5.00	1,090	5.67	1,520	7.40	8,420	6 11	7,130	7.20	9,460
23	4.47	970	5.00	1,090	5.65	1,530	7.00*a*	7,740	6 18	7,210	6.69	8,278
24	4 47	980	5.00	1,080	5.60	1,500	6.60	7,060	6.03	6,911	6.26	7,370
25	4.49	980	5.00	1,070	5.40	1,400	7.00	8,040	5.70	6,270	6.34	7,534
26	4.49	980	5.05	1,080	5.33	1,340	6 87	7,880	5.78	6,422	6.81	8,553
27	4 19	980	5.05	1,090	5.26	1,320	6 32	6,920	5.67	6,213	7.70	10,680
28	4.45	980	5.10	1,100	5.26	1,300	6.17	6,760	5.68	6,232	7.67	10,605
29	4.40	990			5.26	1,300	5.75	6,060	5.77	6,403	7.63	10,505
30	4.50	1,000			5.21	1,300	5.40	5,560	5.79	6,441	7.65	10,555
31	4.50	1,020			5.18	1,280			5.76	6,384		

a Interpolated.
b Jan. 1st to April 16. -Ice conditions.

DAILY GAUGE HEIGHT AND DISCHARGE of South Channel of North Saskatchewan River at Battleford, for 1913.—*Concluded.*

DAY	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	7.70	10,680	7.18	8,460	6.68	8,256	4.75	4,540	4.01	3,463	3.34	1,300
2	7.96	11,336	7.20	8,580	6.65	8,190	4.67	4,405	4.35	2,400*d*	3.33	1,300
3	9.11	14,387	7.24	8,720	6.60	8,080	4.66	4,390	4.80	2,730	3.33	1,310
4	8.87	13,739	7.40	9,180	6.53	7,933	4.59	4,285	4.65	2,550	3.33	1,290
5	8.50	12,740	7.20	8,760	6.50	7,870	4.46	4,090	4.30	2,200	3.29	1,250
6	8.45	12,610	8.05	10,900	6.50	7,870	4.47	4,105	4.12	1,950	3.15	1,210
7	8.20	11,960	8.00	10,840	6.40	7,660	4.47	4,105	4.20	1,980	3.12	1,210
8	7.80	10,930	7.96	10,800	6.34	7,534	4.47	4,105	4.20	2,010	3.17	1,280
9	7.40	9,940	7.80	10,440	6.26	7,370	4.45	4,075	4.20	2,040	3.25	1,390
10	7.27	9,628	7.78	10,460	5.92	6,690	4.47	4,105	4.18	2,040	3.35	1,500
11	7.27	9,628	7.50	9,860	6.31	7,471	4.57	4,255	4.15	2,010	3.45	1,630
12	7.25	9,580	7.15	9,080	6.30	7,450	4.52	4,180	4.10	1,950	3.57	1,700
13	7.24	9,556	6.98	8,740	5.81	6,479	4.33	3,895	4.00	1,870	3.65	1,750
14	7.24	9,556	6.79	8,360	5.76	6,384	4.32	3,880	3.90	1,770	3.77	1,790
15	7.22	9,508	8.39	12,300	5.69	6,251	4.22	3,738	3.60	1,610	2.75	1,800
16	7.19	9,436	8.35	12,350	5.65	6,175	4.14	3,632	3.55	1,460	3.74	1,810
17	7.17	9,388	8.52	12,794	5.37	5,656	4.10	3,580	3.52	1,430	3.76	1,810
18	7.22	9,312	8.65	13,145	5.35	5,620	4.09	3,567	3.50	1,410	3.76	1,810
19	7.32	9,020	8.84	13,658	5.31	5,548	4.05	3,515	3.50	1,400	3.74	1,810
20	8.60	11,700	8.82	13,604	5.29	5,512	4.04	3,502	3.50	1,390	3.73	1,810
21	8.55	11,040	8.57	12,929	5.29	5,512	3.99	3,438	3.50	1,370	3.72	1,820
22	8.57	11,140	8.03	11,518	5.25	5,440	3.99	3,438	3.50	1,360	3.72	1,840
23	8.43	10,860	7.56	10,330	5.20	5,350	3.97	3,414	3.50	1,350	3.74	1,860
24	8.60	11,400	7.50	10,180	5.14	5,242	3.95	3,390	3.40	1,300	3.74	1,890
25	8.65	11,580	6.97	8,921	5.16	5,278	3.95	3,390	3.28	1,180	3.76	1,890
26	8.60	11,540	6.95	8,875	5.15	5,260	3.97	3,414	3.15	1,100	3.79	1,880
27	8.55	11,480	6.76	8,438	5.10	5,170	3.97	3,414	3.09	1,050	3.81	1,870
28	7.90	9,900	6.75	8,415	5.00	4,990	3.98	3,426	3.13	1,100	3.79	1,860
29	7.20	8,360	6.71	8,323	5.00	4,990	4.15	3,645	3.21	1,200	3.79	1,830
30	7.20	8,400	6.70	8,300	4.90	4,810	4.52	4,180	3.34	1,290	3.74	1,810
31	7.19	8,440	6.70	8,300	.....	.....	5.29	5,512	.....	.....	3.73	1,810*d*

d Nov. 2 to Dec. 31.—Ice conditions.

MONTHLY DISCHARGE of South Channel of North Saskatchewan River at Battleford for 1913.

MONTH.	DISCHARGE IN SECOND-FEET.			RUN-OFF.
	Maximum.	Minimum.	Mean.	Total in acre-feet.
January	1,350	820	989	60,811
February	1,350	10,60	1,162	64,534
March	1,530	1,080	1,267	77,905
April	12,980	1,270	4,278	254,558
May	7,310	3,306	5,199	319,674
June	21,020	6,380	9,510	565,884
July	14,387	8,360	10,606	652,137
August	13,658	8,300	10,182	626,067
September	8,256	4,810	6,401	380,886
October	4,540	3,390	3,891	239,248
November	3,463	1,050	1,898	112,939
December	1,890	1,210	1,649	101,393
The year	.....	.....	.....	3,456,036

Monthly Discharge of North Saskatchewan River at Battleford, for 1913

(Drainage area (*a*) square miles).

Month.	Discharge in Second-Feet.			Run-Off.
	Maximum.	Minimum.	Mean.	Total in Acre-feet.
January	1,650	1,010	1,220	75,015
February	1,790	1,240	1,553	86,249
March	2,420	1,570	1,963	120,701
April	31,430	1,950	9,621	572,489
May	14,326	5,404	9,664	594,216
June	48,230	12,453	19,941	1,186,571
July	31,797	18,574	23,104	1,420,610
August	29,548	16,324	21,631	1,330,039
September	16,308	8,234	11,874	706,552
October	7,910	5,488	6,432	395,489
November	7,263	2,470	3,706	220,522
December	2,500	1,680	2,161	132,875
The year				6,841,328

a The drainage area of this stream cannot be obtained with any degree of accuracy and in any case would be misleading so no computations involving the same have been made.

NORTH SASKATCHEWAN RIVER AT EDMONTON.

This station is located at the low-level traffic and railway bridge in the city of Edmonton, on the N.W. ¼ of Sec. 33, Tp. 52, Rge. 24, West of the 4th meridian.

There are two plain staff gauges at the station, a low level one reading from zero to ten feet and a high level one reading from ten to thirty-four feet. The high level gauge is spiked perpendicularly to a high timber pier a short distance above the mill of the Edmonton Lumber Company. The low level gauge is attached to a pier about 75 feet above the other and some 200 feet from the right bank. Both gauges are graduated to feet and tenths and are about 300 yards downstream from the bridge. The zero of the gauges (elevation 1991.085) is referred to a permanent iron bench mark (elevation 2025.04) located under the stay line to the stack of the mill and about 50 feet from the high level gauge. This bench mark is referred to the Department of Public Works bench mark on the left abutment of the bridge, which is elevation 2025.00 feet above sea level.

The channel is straight for about 700 feet above and 200 feet below the station. Both banks are high, of an earth formation and sparsely covered with brush. The bed of the stream is composed of sand and gravel and is liable to shift slightly. The stream is divided into four channels by the three bridge piers.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the stream face of the left or north abutment. Distances are marked on the handrail of the bridge.

The bridge is a four span steel structure supported by concrete piers and abutments. Between the right pier and the shore and extending for some distance above and below the bridge, there is a row of timber piers with a long string of booms attached to them. This boom is for the purpose of conducting logs to the Edmonton Lumber Company's mill, a short distance below the bridge. The boom is sometimes full of logs and at such times it becomes very hard to obtain velocity observations in this span.

This station was first used by this survey during 1911 and the gauge height observations were supplied by the Edmonton Lumber Company. Mr. Schneider made the observations for the Company during 1913.

Discharge Measurements of North Saskatchewan River at Edmonton, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*S.. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 17–18	F. R. Burfield	470	982	1.23	8.95	1,207
Feb. 1	do	470	1,082	1.43	9.59	1,552
Feb. 10	V. Meek	470	1,015	1.26	9.31	1,280
Feb. 25	do	470	1,043	1.19	9.35	1,239
April 2	do	411	1,088	1.82	9.81	1,972
April 21	do	560	4,863	3.43	13.78	16,705
May 2	G. R. Elliott	437	2,338	1.67	9.04	3,908
May 12	V. Meek	454	2,616	2.41	9.90	6,313
June 2–3	J. S. Wright	560	3,944	3.24	13.50	12,785
June 23	G. J. Smith	575	6,661	4.04	17.37	26,890
July 3	H. B. R. Thompson	512	6,000	3.78	15.74	22,639
July 21	P. H. Daniells	569	5,370	3.52	14.10	18,906
Aug. 1	do	558	5,247	3.44	13.60	18,034
Aug. 23	do	540	4,340	2.67	12.53	11,663
Sept. 1	G. H. Whyte and P. H. Daniells	555	4,571	3.12	13.21	14,450
Sept. 15	P. H. Daniells	491	3,307	2.43	10.75	8,031
Sept. 23	do	496	3,000	2.31	10.50	6,924
Oct. 2	do	458	2,561	2.13	9.77	5,467
Oct. 14	do	411	2,421	1.76	8.93	4,278
Oct. 30	do	402	2,241	1.48	8.37	3,187
Nov. 15	do	368	1,877	1.23	7.86	2,315
Dec. 2–3	do	444	2,131	0.79	8.26	1,684
Dec. 26–27	do	460	1,422	0.46	7.09	652

Daily Gauge Height and Discharge of North Saskatchewan River at Edmonton, for 1913.

Day.	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec-ft..*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	9.5	1,720	9.6	1,560	9.2	1,230	9.2	1,900	9 40	5,100	13.4	15,400
2	9.7	1,710	9.6	1,520	9.2	1,240	9.4	1,970	9.20	4,700	13.4	15,400
3	9.9	1,700	9.6	1,480	9.2	1,250	9.6	2,000	9.10	4,500	13.4	15,400
4	9.8	1,660	9.6	1,450	9.2	1,260	9.6	2,030	9.20	4,700	13.3	15,100
5	9.4	1,610	9.5	1,410	9 2	1,270	9 6	2,060	9 20	4,700	13.4	15,400
6	9.1	1,560	9.6	1,380	9.3	1,270	10 0	2,080	9 20	4,700	13.7	16,300
7	8.9	1,450	9.6	1,360	9 3	1,270	10 2	2,110	9.10	4,500	14.0	17,300
8	8.9	1,360	9.5	1,330	9 3	1,260	10.1	2,140	9 00	4,300	13.7	16,300
9	8.9	1,310	9.4	1,300	9.4	1,240	10 0	2,170	9 00	4,300	13 2	14,800
10	8.9	1,280	9.3	1,280	9 4	1,230	10 0	2,200	9.20	4,700	13 9	16,950
11	8.9	1,260	9.3	1,270	9 4	1,220	9 9	2,500	9 20	4,700	14 9	20,600
12	8.8	1,240	9.4	1,260	9 4	1,220	10.2	3,000	9 40	5,100	15 5	23,000
13	8.8	1,230	9.4	1,280	9 4	1,220	10 6	5,000	12 50	12,700	15.6	23,400
14	8.9	1,220	9 5	1,290	9 4	1,210	10 8	7,000	12.70	13,300	15.1	21,400
15	8.8	1,210	9.6	1,310	9 4	1,210	11 0	8,700	12.70	13,300	15.1	21,400
16	8.8	1,210	9.5	1,310	9 3	1,210	16 2	26,100	13 00	14,200	15.0	21,000
17	8.9	1,210	9.5	1,280	9 2	1,210	14 3	18,350	12 80	13,600	14.3	18,350
18	9.0	1,210	9.5	1,270	9.1	1,210	16 4	27,000	12 70	13,300	14 3	18,350
19	9.0	1,220	9.5	1,260	9 1	1,220	13 9	16,950	12 80	13,600	13 3	15,100
20	9.0	1,230	9.5	1,250	9 0	1,230	13 8	16,600	12 80	13,600	12 3	12,100
21	9.1	1,260	9.5	1,250	9 0	1,230	13 7	16,300	12 30	12,100	12 7	13,300
22	9.1	1,280	9.4	1,250	9 0	1,230	13 6	16,000	11 90	10,950	16.1	25,650
23	9.1	1,320	9.4	1,240	8 9	1,250	12 9	13,900	12 00	11,200	16 9	29,250
24	9.2	1,360	9.4	1,240	8 9	1,320	11 8	10,700	12 10	11,500	15 5	23,000
25	9.3	1,390	9.4	1,240	9 0	1,390	11 0	8,700	12 40	12,400	14 8	20,200
26	9.3	1,440	9.4	1,230	9 1	1,450	10 3	6,950	12 20	11,800	14 4	18,700
27	9.3	1,470	9.3	1,230	9.1	1,480	10 0	6,300	12 20	11,800	16 1	25,650
28	9.3	1,480	9.2	1,230	9.2	1,530	9 6	5,500	12 70	13,300	16.5	27,450
29	9.4	1,500			9 2	1,650	9 6	5,500	12 80	13,600	16 5	27,450
30	9 5	1,520			9 2	1,750	9 4	5,100	13 10	14,500	17.0	29,700
31	9.7	1,570			9 1	1,820			13 20	14,800		

Daily Gauge Height and Discharge of North Saskatchewan River at Edmonton, for 1913.—*Concluded.*

Day	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Dis-Height.	Gauge charge	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	16 7	28,350	14 6	19,400	13 4	15,400	9 70	5,700	8 0	2,650	8 1	1,740
2	16 1	25,650	13 2	14,800	13 3	15,100	9 7	5,700	7 9	2,500	8 1	1,700
3	16 0	25,200	13 6	16,000	13 0	14,200	9 7	5,700	7 7	2,200	8 1	1,670
4	15 7	23,850	13 7	16,300	12 9	13,900	9 7	5,700	7 8	2,360	7 9	1,630
5	15 1	21,400	13 2	14,800	12 6	13,000	9 8	5,900	7 9	2,500	7 7	1,600
6	14 1	17,650	13 3	15,100	12 4	12,400	9 9	6,100	8 2	2,950	8 3	1,570
7	13 9	16,950	14 4	18,700	12 0	11,200	9 8	5,900	8 2	2,950	7 9	1,530
8	13 6	16,000	14 2	18,000	12 3	12,100	9 7	5,700	8 2	2,950	8 0	1,480
9	14 6	19,400	14 5	19,050	12 0	11,200	9 5	5,300	8 1	2,800	7 9	1,430
10	14 7	19,800	14 6	19,400	11 5	9,950	9 4	5,100	8 1	2,800	7 9	1,370
11	14 0	17,300	17 3	31,100	11 3	9,450	9 3	4,900	8 2	2,950	7 8	1,310
12	14 3	18,350	16 2	26,100	11 6	10,200	9 2	4,700	8 0	2,650	7 7	1,230
13	14 0	17,300	16 2	26,100	11 3	9,450	9 2	4,700	8 1	2,800	7 7	1,120
14	13 9	16,950	16 3	26,550	11 0	8,700	9 2	4,700	7 8	2,360	7 7	1,020
15	15 2	22,200	17 6	32,600	10 9	8,450	9 2	4,700	7 7	2,320	7 7	950
16	17 0	29,700	17 4	31,600	11 0	8,700	9 1	4,500	7 6	2,290	7 9	870
17	15 9	24,750	16 9	25,200	10 8	8,200	9 0	4,300	7 4	2,280	7 9	830
18	14 9	20,600	15 6	23,400	10 7	7,950	9 0	4,300	9 3	2,250	7 8	780
19	14 2	18,000	14 4	18,700	10 5	7,450	9 0	4,300	10 1	2,230	7 7	750
20	14 0	17,300	14 0	17,300	10 7	7,950	8 9	4,100	10 1	2,200	7 7	720
21	14 1	17,650	13 5	15,700	10 6	7,700	8 8	3,910	9 3	2,170	7 7	690
22	14 4	18,700	13 0	14,200	10 6	7,700	8 7	3,740	9 1	2,130	7 9	670
23	15 0	21,000	12 5	12,700	10 5	7,450	8 7	3,740	9 0	2,090	7 7	660
25	16 3	26,550	11 9	10,950	10 4	7,200	8 7	3,740	8 8	2,040	7 7	650
25	15 9	24,750	11 4	9,700	10 4	7,200	8 7	3,740	8 9	2,000	7 5	650
26	15 6	23,400	11 8	10,700	10 2	6,700	8 6	3,570	8 1	1,950	7 3	650
27	15 5	23,000	12 9	13,900	10 0	6,300	8 5	3,410	7 3	1,900	7 1	660
28	15 3	22,200	13 0	14,200	9 9	6,100	8 4	3,250	7 5	1,850	6 9	670
29	15 7	23,850	12 9	13,900	9 8	5,900	8 3	3,100	7 7	1,810	6 8	690
30	15 6	23,400	12 8	13,600	9 7	5,700	8 5	3,410	7 9	1,770	7 8	730
31	15 6	23,400	12 9	13,900	.....	...	8 3	3,100	.....	.....	7 0	770

Monthly Discharge of North Saskatchewan River at Edmonton, for 1913

(Drainage area, 10,780 square miles)

Month.	Discharge in Second-Feet.			Run-Off.		
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	1,720	1,210	1,393	0 129	0 149	85,653
February	1,560	1,230	1,313	0 122	127	72,920
March	1,820	1,210	1,315	122	141	80,857
April	27,000	1,900	8,227	763	0 851	489,540
May	14,800	4,300	9,727	0 902	1 040	598,089
June	29,700	12,100	19,780	1 830	2 040	1,176,992
July	29,700	16,000	21,439	1 990	2 290	1,318,233
August	32,600	9,700	18,505	1 720	1 980	1,137,828
September	15,400	5,700	9,430	0 875	0 976	561,124
October	6,100	3,100	4,539	121	485	279,092
November	2,950	1,770	2,357	219	224	140,251
December	1,740	650	1,058	0 098	0 113	65,054
The year					10 436	6,905,633

NORTH SASKATCHEWAN RIVER NEAR ROCKY MOUNTAIN HOUSE.

This station was established June 2, 1913, by G. H. Whyte. It is located on the N. E. ¼ Sec. 21, Tp. 39, Rge. 7, W. 5th Mer., and about one mile from the village of Rocky Mountain House.

The gauge, which is an inclined staff reading to feet and tenths, is located on the left bank of the river some 60 feet above the ferry cable and about 1,000 feet below the railway bridge. The zero of the gauge (elev. 3108.39) is referred to a stump (assumed elev. 3127.74 "Public Works of Canada") located on the left bank in front of the ferry cable-tower.

In October 1913, a cable station was constructed about 500 feet below the gauge which will enable the survey to make regular gaugings at this point throughout the year and it is expected that the daily discharges for 1913 will be computed and included in the 1914 report.

The gauge was read until November by D. Hayes and after that date by W. Austin.

MEAN DAILY GAUGE HEIGHT, in feet, of North Saskatchewan River, near Rocky Mountain House, for 1913.

DAY.	JUNE.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER	NOVEMBER.	DECEMBER.
1	.....	8.65	7.65	7.90	5.60	4.40	3.90
2	7.60	8.70	8.30	7.05	5.50	4.50	4.00
3	7.50	8.20	8.60	7.45	5.75	4.30	4.10
4	7.55	8.75	8.90	7.45	5.65	4.50	4.00
5	7.55	8.25	9.00	7.90	5.50	4.20	3.90
6	7.50	7.05	8.85	7.45	5.40	4.10	3.70
7	7.20	7.50	8.90	6.75	5.25	4.30	3.80
8	7.55	9.15	8.55	7.45	5.20	4.20	4.00
9	8.55	8.00	9.85	7.30	5.10	4.20	4.00
10	9.00	7.75	10.35	6.70	5.10	4.30	4.20
11	9.35	7.90	9.80	6.85	5.00	4.30	4.70
12	9.05	7.80	9.85	6.65	5.00	4.20	4.40
13	8.80	7.50	10.80	6.55	5.00	4.10	4.30
14	8.65	8.05	10.30	6.75	4.80	3.90	4.70
15	8.20	7.50	9.60	6.65	4.90	4.10	4.80
16	7.25	7.05	8.65	6.50	5.00	4.20	5.20
17	7.20	6.95	8.10	6.35	4.90	4.30	5.10
18	7.35	7.05	7.70	6.45	4.85	4.30	5.20
19	7.45	7.40	7.40	6.65	4.75	4.10	4.70
20	7.75	8.25	7.00	6.45	4.70	4.00	4.60
21	9.25	8.85	6.65	6.30	4.60	4.00	5.80*a*
22	8.30	9.90	7.05	6.20	4.50	3.70	5.60
23	7.75	10.35	6.70	6.25	4.55	3.90	5.40
24	7.55	9.90	7.30	6.15	4.60	4.00	5.50
25	7.65	9.80	7.65	6.05	4.50	4.30	5.30
26	8.55	9.75	7.65	5.90	4.50	4.40	5.60
27	8.25	9.20	7.80	5.80	4.50	4.30	5.70
28	8.40	8.85	7.65	5.70	4.50	4.00	5.90
29	8.45	8.80	7.30	5.60	4.50	3.80	5.80
30	8.50	8.30	7.65	5.80	4.40	3.70	5.80
31	....	7.65	7.90	....	4.40	....	5.60*b*

a to b Ice conditions.

BATTLE RIVER AT BATTLEFORD.

This station was established on June 17, 1911, by H. R. Carscallen. It is located at the traffic bridge in the town of Battleford on the S.E. ¼ Sec. 19, Tp. 43, Rge. 16, W. 3rd Mer.

The gauge, which is of the standard chain type, is located level with the floor of the bridge at chainage 45. The zero of the gauge (elev. 72.53) is referred to a bench mark (assumed elv. 100.00), situated on the top of the left abutment on the outer downstream corner.

The channel is straight for 300 yards above and half a mile below the station. Both banks are fairly high and clean. The bed of the stream is composed of sand which shifts considerably. Backwater from floods on the North Saskatchewan, into which this stream empties some three miles below the station, gives trouble in computing accurate discharges.

Discharge measurements are made with a current meter from the bridge which is a three-span steel structure. The initial point for sounding is the inner face of the left abutment. Distances are marked on the handrail on the downstream side of the bridge.

During 1913, Mr. C. J. Johnson of the Indian Agency staff took the observations.

Discharge Measurements of Battle River at Battleford, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*S.. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 8.....*b*	O. H. Hoover	105	89.8	0.38	4.69	34
Feb. 6.....*b*	do	50	56.9	0.53	4.95	30
April 4.....	do	244	839.0	1.80	9.15	1,514 *a*
April 21.....	do	199	866.0	2.89	6.66	2,504
May 19.....	do	179	386.0	1.78	4.47	687
June 21.....	do	113	226.0	1.59	3.80	359
July 19.....	do	174	368.0	1.33	4.62	491
Aug. 18.....	do	175	375.0	.91	4.46	340
Sept. 19.....	do	166	296.0	1.51	4.05	446
Oct. 16.....	do	126	276.0	1.34	3.87	370
Nov. 8.....*b*	do	114	219.0	.95	3.90	208
Nov. 24.....*b*	do	86	164.0	.87	3.99	144
Dec. 18.....*b*	F. R. Steinberger	78	118.0	.51	4.12	60

a Discharge on top of winter ice.
b Ice conditions.

Daily Gauge Height and Discharge of Battle River at Battleford, for 1913

Day.	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft..*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1.....	5.08	100*a*	4.82	30	5.23	50	5.42	1,366	6.02	1,878	4.26	586
2.....	5.08	100	4.83	30	5.26	60	5.75	1,635	5.88	1,752	4.25	580
3.....	5.10	100	4.85	30	5.31	70	7.72	3,620	5.73	1,617	4.22	562
4.....	5.12	100	4.89	30	5.32	80	9.10	5,120	5.52	1,446	4.24	574
5.....	5.15	110	4.90	40	5.32	85	9.32	5,362	5.50	1,430	4.22	562
6.....	5.19	130	4.95	30	5.34	85	9.14	5,164	5.50	1,430	4.20	550
7.....	5.25	120	4.97	30	5.34	70	9.66	5,736	5.44	1,382	4.16	526
8.....	4.69	34	5.00	40	5.28	60	9.64	5,714	5.25	1,230	4.16	526
9.....	4.71	40	5.01	40	5.14	50	9.28	5,318	5.14	1,148	4.14	514
10.....	4.74	50	5.01	50	5.09	50	8.42	4,376	5.06	1,092	4.10	490
11.....	4.74	40	5.02	60	5.54	70	8.22	4,160	5.02	1,064	4.05	460
12.....	4.76	30	5.04	65	5.14	60	7.63	3,523	5.01	1,057	4.05	460
13.....	4.76	30	5.06	60	5.09	40	7.77	3,674	4.96	1,022	4.03	448
14.....	4.78	30	5.09	60	4.89	25	7.74	3,641	4.92	994	3 99	425
15.....	4.79	35	5.11	65	4.98	30	7.31	3,181	4.74	874	3.97	415
16.....	4 79	35	5.17	70	5.04	50	6.58	2,420	4.65	820	4.04	454
17.....	4.79	40	5.22	90	5.19	70	6.40	2,240	4.60	790	4.02	442
18.....	4.78	50	5 24	100	5.38	110	6.95	2,802	4.55	760	4.01	436
19.....	4.80	40	5.21	80	5.51	150	6.96	2,813	4.50	730	3.96	410
20.....	4.80	30	5.21	80	5.61	150	6.96	2,813	4.55	760	3.94	400
21.....	4.80	50	5.23	85	5.44	140	6.68	2,520	4.60	790	3.84	350
22.....	4.82	50	5 24	85	5.52	150	6.48	2,320	4.52	742	3.84	350
23.....	4 83	40	5.27	70	5.55	150	6.18	2,022	4.47	712	3.80	330
24.....	4 83	40	5 31	65	5.59	90	5.94	1,806	4.44	694	3.80	330
25.....	4.85	50	5 25	60	5.17	70	5.92	1,788	4.44	691	3.80	330
26.....	4.87	60	5.23	60	5.25	50	6.45	2,290	4.42	682	3 86	360
27.....	4.90	70	5 21	65	5.20	40	6.14	1,986	4.38	658	3.90	380
28.....	4.89	60	5 21	50	5.16	40	6 09	1,941	4 36	646	3.87	365
29.....	4.85	55	.....	.....	5.12	40	6.11	1,959	4.32	622	3.86	360
30.....	4.71	40	.....	.....	5.08	50	6 08	1,932	4.28	598	4.00	430
31.....	4.71	20	.....	.....	5.11	100*a*	.....	.....	4.25	580	.....	.....

a Jan. 1st to March 31.—Ice conditions.

DAILY GAUGE HEIGHT AND DISCHARGE of Battle River at Battleford, for 1913.—*Concluded.*

DAY.	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	4.34	634	4.02	442	3.98	420	3.97	415	3.73	280*c*	3.99	140
2	4.31	616	4.00	430	3.98	420	3.97	415	3.82	320	3.97	130
3	4.48	718	4.01	436	4.02	444	4.01	436	3.90	325	3.98	130
4	4.41	676	4.02	442	4.02	444	4.05	460	3.96	320	3.99	140
5	4.26	586	4.05	460	4.04	454	4.02	442	3.94	270	3 99	145
6	4.15	520	4.10	490	4.08	478	3.96	410	3.92	270	4.00	140
7	4.10	490	4.09	484	4.11	496	3.94	400	3.90	260	4.00	150
8	4.10	490	4.08	478	4.10	490	3.93	395	3.90	250	4.02	150
8	4 07	472	4.06	466	4.10	490	3.92	390	3.89	208	4.03	150
10	4.05	460	4.02	442	4.10	490	3.92	390	3.86	200	4.03	150
11	4.00	430	4.00	430	4.10	490	3.91	385	3.80	190	4.05	140
12	4.00	430	3.98	420	4.10	490	3.89	375	3.75	180	4.08	140
13	4.01	436	3.96	410	4.10	490	3.91	385	3.78	160	4.08	140
14	4.01	436	4.05	405	4.10	490	3.89	375	3.82	170	4.08	140
15	4.04	454	4.21	465*b*	4.09	484	3.87	365	3.84	180	4.09	140
16	4.12	502	4.22	375	4.08	478	3.87	365	3.88	190	4.09	120
17	4.40	560*a*	4.26	320	4.05	460	3.87	365	3.90	190	4.09	90
18	4.38	455	4.61	430	4.08	478	3.90	380	3.90	170	4.12	60
19	4.45	400	4.76	575	4.07	472	3.86	360	3.94	160	4.00	55
20	4.51	455	4 64	580	4.08	478	3.81	335	3.92	150	4.03	60
21	4.44	460	4.30	465	4.17	532	3.79	325	3.94	130	4.07	80
22	4.38	460	4.16	460	4.11	496	3.77	315	3.95	130	4.12	70
23	4.46	530	4.12	502*b*	4.08	478	3.77	315	3.99	130	4.12	60
24	4.50	590	4.10	490	4.07	472	4.77	315	3.99	144	4.11	60
25	4.41	580	4.10	490	4.05	460	3.76	310	3.99	150	4.12	70
26	4.30	540	4.08	478	4.03	448	3.76	310	3.99	140	4.11	65
27	4.21	525*a*	4.08	478	4.01	436	3.83	345	3.99	140	4.10	60
28	4.14	514	4.06	466	4.01	436	3.93	395	3.99	140	4.10	50
29	4.12	502	4.06	466	4.00	430	3.73	295	3.99	140	4.12	40
30	4.09	484	4.03	448	3.99	425	3.69	275	3.99	140	4.13	38
31	4.06	466	4.02	442	.....	.....	3.70	280	.....	.....	4.15	40*c*

a—*a*—Gauge height affected by back water from North Saskatchewan River.
b—*b*—Gauge height affected by back water from North Saskatchewan River.
c—Ice conditions Nov. 1st to Dec. 31.

MONTHLY DISCHARGE of Battle River at Battleford, for 1913

(Drainage area 11,850 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	130	20	57	0.005	0.006	3,529
February	100	30	58	0 005	.005	3,216
March	150	25	75	.006	.007	4,630
April	5,736	1,366	3,175	.268	.299	188,925
May	1,878	580	990	.083	.096	60,873
June	586	330	447	.038	.042	26,598
July	718	400	512	.043	.050	31,482
August	580	320	457	.038	.044	28,100
September	532	420	468	.039	.044	27,848
October	460	275	365	.031	.036	22,443
November	325	130	194	.016	.018	11,544
December	150	38	101	0.008	0.009	6,210
The year					0.656	415,398

BATTLE RIVER AT PONOKA.

This station was established May 7, 1913, by V. Meek. It is located in the village of Ponoka, at the steel traffic bridge 300 yards southeast of the C.P.R. depot, in the S.W. ¼ Sec. 4, Tp. 25, Rge. 43, West of the 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is situated at the eft bank 30 feet upstream from the bridge. It is referred to the top of a spike in a pile on the upstream side of the left abument (elev. 11.69 above the zero of the gauge.)

The channel is straight for 100 feet above and 50 feet below the station. Both banks are clay and covered with brush and are not likely to overflow. The bed of the stream is sandy.

Measurements are made from the downstream side of the bridge. The initial point for soundings is the inner face of the left abutment. Distances are marked every five feet on the handrail.

During 1913 the gauge was read by G. R. Edwards.

DISCHARGE MEASUREMENTS of Battle River at Ponoka, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 7	V. Meek	66.0	174	0.69	3.36	119
May 26	J. S. Wright	67.8	188	0.65	3.45	123
June 16	G. J. Smith	49.0	142	0.94	3.98	134
July 9	H. B. R. Thompson	70.2	230	0.83	3.96	191
July 17	P. H. Daniells	81.0	451	1.36	6.54	611
July 29	do	64.0	182	0.44	3.16	81
Aug. 8	do	62.0	152	0.33	2.65	51
Aug. 20	do	67.0	244	0.90	4.10	217
Sept. 5	do	60.0	160	0.55	3.03	88
Sept. 17	do	60.0	133	0.30	2.53	40
Sept. 25	do	60.0	133	0.25	2.51	33
Oct. 18	do	61.0	136	0.32	2.45	44
Nov. 3	do	60.0	127	0.29	2.42	37
Dec. 9	do	25.0	20	0.76	2.29	16

Daily Gauge Height and Discharge of Battle River at Ponoka, for 1913.

Day.	May		June		July		August	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	.....	.....	3.19	99	4.98	345	3.10	90
2	.....	.....	3.15	95	4.70	301	3.06	86
3	.....	.....	3.14	94	4.52	274	3.00	80
4	.....	.....	3.20	100	4.30	241	2.80	62
5	.....	.....	3.32	112	4.20	227	2.70	54
6	.....	.....	3.61	146	4.25	234	2.65	50
7	3.36*a*	117	3.58	143	4.15	220	2.60	47
8	3.36	117	3.51	134	4.05	206	2.65	50
9	3.36	117	3.42	123	3.85	178	2.65	50
10	3.39	120	3.30	110	3.69	157	2.65	50
11	3.41	122	3.25	105	3.60	145	2.75	58
12	3.38	119	3.21	101	3.50	133	2.70	54
13	3.33	113	3.40	121	3.68	155	2.85	66
14	3.43	125	3.36	117	4.22	230	3.33	113
15	3.57	141	3.78	168	5.85	490	4.05	206
16	3.72	161	3.98	196	6.48	600	4.50	271
17	3.75	164	3.92	188	5.53	436	4.32	244
18	4.02	202	3.92	188	5.54	438	4.20	227
19	3.88	182	3.84	177	5.56	441	4.18	224
20	3.79	170	3.75	164	4.95	340	3.87	181
21	3.71	159	4.20	227	4.43	260	3.68	155
22	3.66	153	4.15	220	4.45	264	3.55	139
23	3.61	146	4.12	216	4.42	259	3.35	116
24	3.58	143	3.85	178	3.39	120	3.18	98
25	3.52	135	3.73	162	3.38	119	3.05	85
26	3.50	133	3.75	164	3.36	117	3.00	80
27	3.36	117	3.97	195	3.27	107	2.93	74
28	3.32	112	4.80	316	3.20	100	2.87	68
29	3.26	106	5.04	354	3.15	95	2.81	63
30	3.24	104	5.14	370	3.12	92	2.77	60
31	3.21	101	.....	.....	3.10	90	2.90	71

a Gauge established.

DAILY GAUGE HEIGHT AND DISCHARGE of Battle River at Ponoka, for 1913.—*Concluded.*

DAY.	September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	3.05	85	2.45	37	2.48	39	2.25	26
2	3.20	100	2.54	43	2.45	37	2.25	26
3	3.11	91	2.56	44	2.43	36	*b*	.....
4	3.04	84	2.58	46	2.41	35	.....	.....
5	3.04	84	2.70	54	2.40	34	.....	.....
6	2.97	77	2.68	53	2.40	34	.....	.....
7	2.90	71	2.65	50	2.42	35	.....	.....
8	2.84	66	2.65	50	2.43	36	.....	.....
9	2.75	58	2.64	50	2.45	37	.....	.....
10	2.72	56	2.60	47	2.44	36	.....	.....
11	2.67	52	2.60	47	2.37	33	.....	.....
12	2.64	50	2.60	47	2.33	30	.....	.....
13	2.62	48	2.60	47	2.34	31	.....	.....
14	2.61	48	2.61	48	2.35	32	.....	.....
15	2.59	46	2.55	44	2.35	32	.....	.....
16	2.56	44	2.58	46	2.35	32	.....	.....
17	2.55	44	2.60	47	2.36	32	.....	.....
18	2.59	46	2.40	34	2.35	32	.....	.....
19	2.64	50	2.48	39	2.36	32	.....	.....
20	2.63	49	2.53	42	2.34	31	.....	.....
21	2.60	47	2.55	44	2.30	29	.....	.....
22	2.53	42	2.55	44	2.29	28	.....	.....
23	2.53	42	2.53	42	2.27	28	.....	.....
24	2.53	42	2.50	40	2.25	26	.....	.....
25	2.52	41	2.45	37	2.24	26	.....	.....
26	2.51	41	2.45	37	2.25	26	.....	.....
27	2.50	40	2.43	36	2.26	27	.....	.....
28	2.51	41	2.42	35	2.25	26	.....	.....
29	2.48	39	2.46	38	2.25	26	.....	.....
30	2.45	37	2.50	40	2.25	26	.....	.....
31	.....	.....	2.50	40	....	.....	.....	.....

b No observer after Dec. 2.

MONTHLY DISCHARGE of Battle River at Ponoka, for 1913

(Drainage area 670 square miles)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Area-feet.
May (7-31)	202	101	135	0.201	0.187	6,694
June	370	94	169	0.252	0.281	10,056
July	600	90	239	0.357	0.412	14,696
August	271	47	106	0.158	0.182	6,518
September	100	37	55	0.082	0.091	3,273
October	54	34	43	0.064	0.074	2,644
November	39	26	31	0.046	0.052	1,845
December 1 and 2	26	26	26	0.039	0.003	103
The period					1.282	45,829

STURGEON RIVER NEAR FORT SASKATCHEWAN.

This station was established December 30, 1913, by P. H. Daniells. I is located on the N.W. ¼ Sec. 28, Tp. 55, Rge. 22, W. of the 4th Mer., on the Traffic bridge about five miles worth of Fort Saskatchewan and about one and a half miles from the mouth of the river.

The gauge, which is a plain staff graduated to feet and hundredths,is nailed to a pile near the right bank about 20 feet from the initial point. The zero of the gauge (elev. 87.52) is referred to a bench mark assumed elev. 100.00), located on the top of the downstream side of the left abutment.

The channel is straight for 200 feet above and 100 feet below the station. Both banks are low but not liable to overflow. The bed of the stream is sandy with a gravel control about 100 feet below which should be fairly permanent. The current is moderate.

Measurements are made from the downstream side of the steel traffic bridge with meter and weights. The initial point for soundings is the stream face of the right abutment.

It was not possible to obtain an observer during 1913 and therefore discharge measurements only were made.

DISCHARGE MEASUREMENTS of Sturgeon River near Fort Saskatchewan, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 6	J. S. Wright	65.0	182	2.10		383
May 30	do	54.5	143	1.09	2.99	156
June 13	G. J. Smith	52.5	135	0.72	2.76	98
July 7	H. B. R. Thompson	53.0	144	1.10		159
July 19	P. H. Daniells	55.0	150	1.20	3.19	180
July 30	do	72.0	175	1.43	3.58	261
Aug. 11	do	61.0	164	1.40	3.47	229
Aug. 22	do	62.0	166	1.46	3.50	243
Sept. 2	do	62.0	169	1.42	3.46	240
Sept. 13	do	60.0	157	1.36	3.39	213
Oct. 15	do	53.0	142	1.00	3.16	143
Dec. 8	do	46.0	95	0.60	3.27	57
Dec. 30	do	43.0	88	0.42	3.70	37

STURGEON RIVER AT ST. ALBERT.

This station was established on April 23, 1913, by V. Meek. It is located between river lots 27 and 52 in St. Albert Settlement, Alberta, at the highway bridge crossing the Sturgeon River in the village of St. Albert.

The gauge, which is a plain staff graduated to feet and hundredths is fastened to a pile in the bed of the stream 20 feet above the bridge. The zero of the gauge (elev. 90.23) is referred o a bench mark (assumed elev. 100.00), located on the cement sill of the east basement window of the St. Albert Hotel and marked "B.M., D.I." and broad arrow, in white paint.

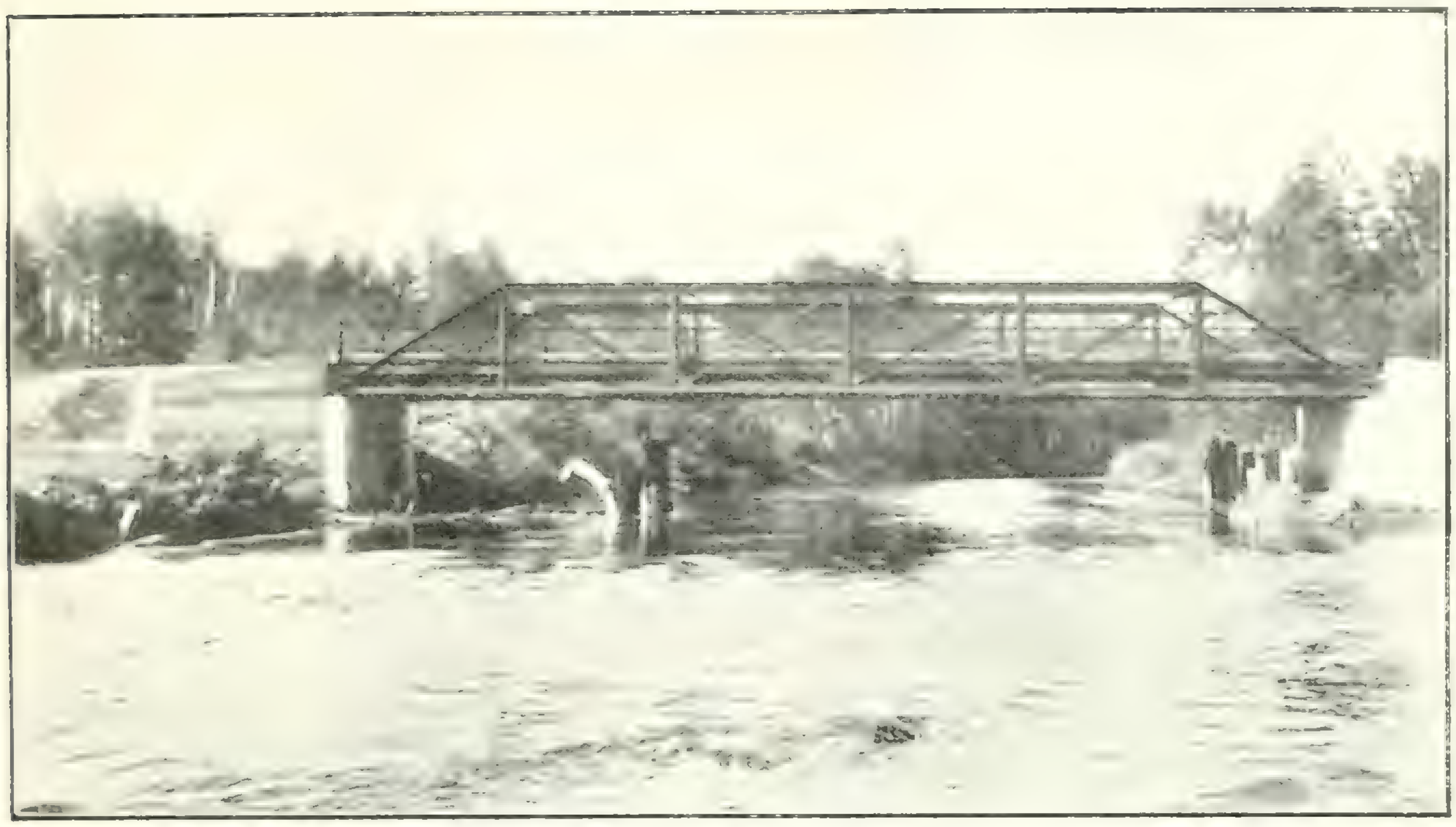
The channel is straight for 500 feet above and below the station. Both banks are fairly high, clean and not liable to overflow. The bed of the stream is sandy, with considerable growth of vegetation which usually causes a change of control during the summer. The current is rather sluggish.

Discharge measurements are made from the downstream side of the steel traffic bridge. The initial point for soundings is a zero marked on the handrail of the bridge; the chainage is marked on the rail every five feet.

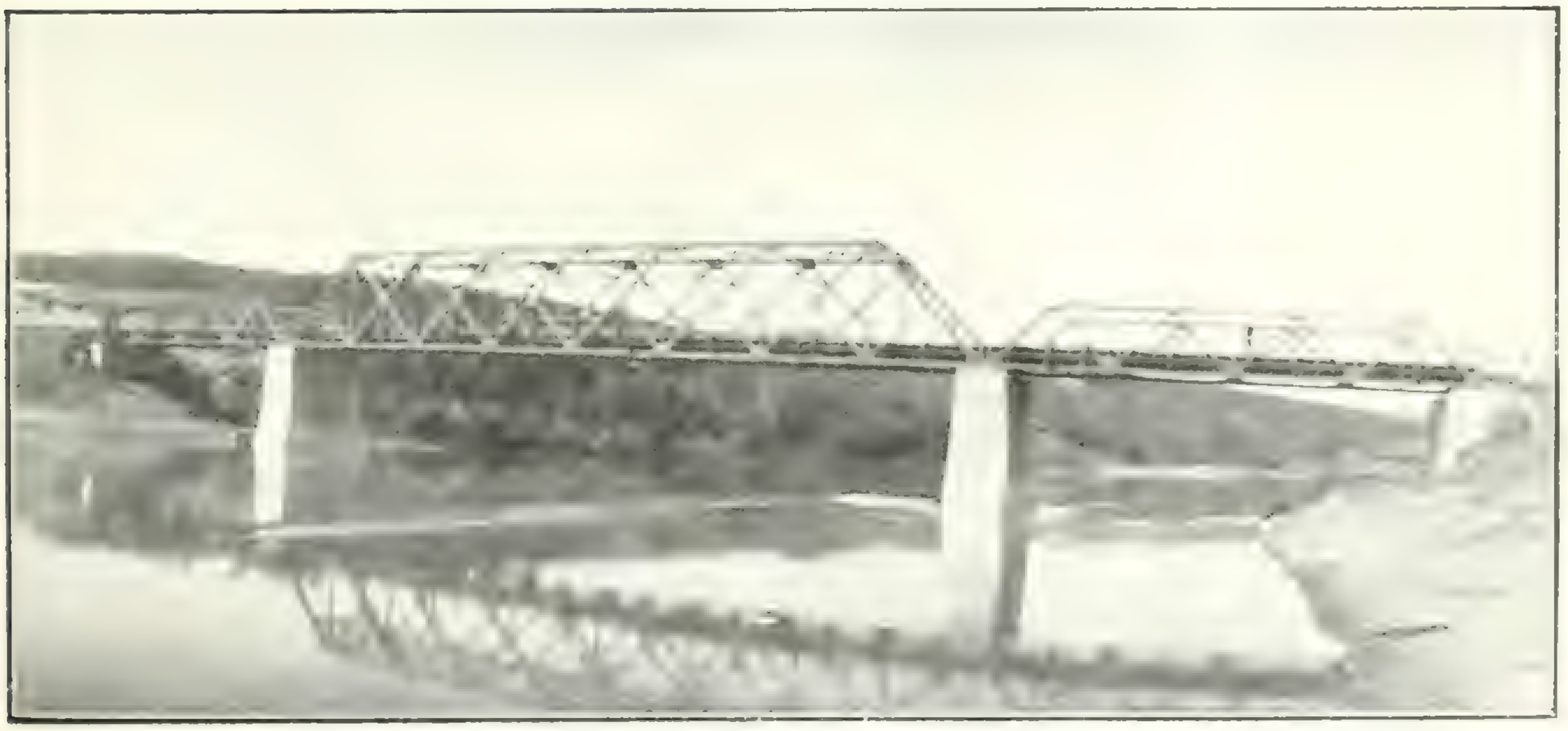
During 1913, the gauge was read daily by Lawrence Farrell and later by Chas. Pelletier.

DISCHARGE MEASUREMENTS of Sturgeon River at St. Albert, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 23	V. Meek	110.0	464	1.27	5 05	589
May 2	do	79.0	306	1.41	3.86	429
May 31	J. S. Wright	70.0	159	0.80	1.95	131
June 21	G. J. Smith	70.0	156	0.59	1.94	93
July 5	H. B. R. Thompson	85.5	227	0.636	2.58	144
July 18	P. H. Daniells	87.0	271	0.60	3 24	168
July 31	do	87.0	366	0.68	4.12	247
Aug. 9	do	87.0	363	0.63	3 98	228
Aug. 21	do	87.5	367	0.62	4.09	228
Sept. 3	do	86.0	343	0.63	3.94	215
Sept. 12	do	86.0	312	0.59	3.63	183
Sept. 24	do	86.0	261	0.58	3 165	152
Oct. 13	do	86.0	239	0.57	2 77	137
Oct. 31	do	86.0	179	0.59	2.38	107
Nov. 17	do	76.0	167	0.61	1 96	103
Dec. 1	do	93.0	132	0.46	2 14	61
Dec. 29	do	85.0	82	0.34	2 06	28



Gauging Station on Sturgeon River near Fort Saskatchewan, Alberta.



Gauging Station on Battle River at Battleford.

Daily Gauge Height and Discharge of Sturgeon River at St. Albert, for 1913

Day.	April		May		June		July	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1			4.00	447	1.85	111	2.65	140
2			3.86	429	1.86	111	2.60	137
3			3.80	422	1.75	109	2.65	140
4			3.65	404	1.65	107	2.55	134
5			3.47	383	1.60	106	2.58	136
6			3.30	364	1.75	109	2 63	138
7			3.15	348	1.65	107	2.68	141
8			3.00	331	1.65	107	2.58	136
9			2.96	327	1.70	108	2.55	134
10			2.90	321	1.75	109	2 63	138
11			2.84	315	1.70	108	2.68	141
12			2.78	309	1.65	107	2.63	138
13			2 74	305	1.70	108	2.68	141
14			2.65	296	1.75	109	2.78	146
15			2.62	293	1.80	110	2.88	151
16			2.54	285	1.85	111	2.93	154
17			2.54	285	1.85	111	2.98	157
18			2.54	285	1.90	112	3.13	166
19			2.50	281	1.85	111	3.28	176
20			2 45	276	1.90	112	3.38	183
21			2.38	269	1.95	113	3.53	193
22			2.35	266	1.95	113	3.68	204
23	5 05[1]	579	2.30	261	2.00	114	3.83	216
24	4 96	566	2.25	256	2.10	117	3.93	224
25	4 76	538	2.20	251	2.10	117	4.03	233
26	4.56	510	2.15	246	2.25	122	4.03	233
27	4 50	512	2.10	241	2 35	126	3.98	228
28	4 35	482	2.05	238	2.50	132	4.03	233
29	4.24	478	2.00	234	2.55	134	4.13	242
30	4 10	460	1.95	229	2.60	137	4.08	237
31			1.90	224			4 10	239

[1] Observations commenced.

Daily Gauge Height and Discharge of Sturgeon River at St. Albert, for 1913.
Concluded

Day.	August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	4.13	242	.....	.....	2.99	142	2.21	107	2.10	61
2	4.18	246	*a*	.....	2.98	142	2.20	107	2.10	60
3	4.13	242	3.94	215	2.95	140	2.18	106	2.10	62
4	4.08	237	3.93	214	2.94	139	2.17	106	2.10	63
5	4.13	242	3.87	208	2.84	134	2.16	106	2.11	65
6	4.08	237	3.75	198	2.76	130	2.13	105	2.10	67
7	4.10	239	3.75	198	2.72	128	2.12	105	2.10	65
8	4.08	237	3.74	197	2.75	130	2.11	104	2.10	62
9	3.98	228	3.73	196	2.73	128	2.12	105	2.10	58
10	*a*	.....	3.72	196	2.70	127	2.11	104	2.10	57
11			3.71	195	2.64	124	2.10	104	2.09	55
12			3.69	193	2.60	122	2.13	105	2.10	55
13			3.68	192	2.57	121	2.08	103	2.10	58
14			3.66	191	2.59	122	2.03	102	2.10	60
15			3.54	181	2.58	121	1.98	100	2.10	63
16			3.46	175	2.55	120	1.98	100	2.09	64
17			3.32	164	2.53	119	1.96	100	2.08	63
18			3.37	168	2.50	118	2.00	101	2.07	61
19			3.39	169	2.46	116	2.06	103	2.06	58
20			3.34	166	2.45	116	2.11	104	2.05	55
21			3.25	160	2.44	116	2.15	106	2.05	53
22			3.25	160	2.44	116	2.16	106	2.04	51
23			3.02	144	2.42	115	2.11	104	2.03	49
24			3.16	153	2.41	114	2.10	104	2.02	46
25			3.12	150	2.39	114	2.10	104	2.01	43
26			3.11	150	2.35	112	2.10	104	2.01	40
27			3.09	148	2.33	111	2.11	104	2.00	36
28			3.03	145	2.30	110	2.11	100	2.00	32
29			3.01	144	2.28	109	2.11	90	2.01	28
30			3.00	143	2.25	108	2.11	80	2.01	29
31			.....	.....	2.24	108	.....	.....	2.01	32

a No observations obtained.

Monthly Discharge of Sturgeon River at St. Albert, for 1913.

(Drainage area, 920 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (23–30)	579	460	516	0.561	0.167	8,188
May	447	224	304	0.330	.380	18,692
June	137	106	114	.124	.138	6,783
July	242	134	174	.189	.218	10,699
August (1-9)	246	228	239	.260	.087	4,264
September (3-30)	215	143	175	.190	.198	9,719
October	142	108	122	.133	.153	7,501
November	107	80	103	.112	.125	6,129
December	67	28	53	0.058	0.067	3,259
The period					1.533	75,234

MISCELLANEOUS DISCHARGE MEASUREMENTS made in North Saskatchewan River drainage basin, in 1913.

Date	Hydrographer.	Stream	Location.	Width	Area of Section	Mean Velocity.	Discharge.
				Feet.	*Sq. ft.*	*Ft. per sec.*	*Sec. ft.*
July 9....	R. Fulcher.....	Brazeau River	39-21-5.....	. .	. . .	. . .	702
" 11....	do	do ..	.....	. .	. .	. . .	751
" 13....	do	do	.....	. .	. .	. . .	802
" 15....	do	do ...	Outlet of Brazeau Lake.....	...	...	....	208
Aug. 13....	P. H. Daniells ..	Pigeon Creek.....	Outlet of Pigeon Lake.....	11.0	5.0	0.42	2.1
" 24....	do .	do	do ..	12.0	5.3	0.24	1.3
Sept. 4....	do	Vermilion River...	N.W. 32-50-6-4..	65.0	193.0	0.25	47.0
Sept. 16....	do	do . .	do ..	10.5	4.3	0.48	2.1
Oct. 17....	do	do	do ..	16.0	7.6	1.12	8.5

SOUTH SASKATCHEWAN RIVER DRAINAGE BASIN.

General Description.

The upper portion of this drainage basin will be dealt in the descriptions of the drainage basins of Bow, Little Bow, Oldman Waterton, Belly and St. Mary Rivers. These streams are all conjoined at a point known as the Grand Forks, to form the South Saskatchewan River. From the Grand Forks the river flows in a north and easterly direction to its junction with the North Saskatchewan River a short distance east of the city of Prince Albert. From this point onward the stream takes the name of the Saskatchewan River.

After the confluence of the Bow and Belly Rivers the stream receives comparatively little drainage, the principal tributaries being the Red Deer River, draining that portion of the basin between the North and the South Saskatchewan River, and Sevenpersons River and Swiftcurrent creek emptying into the main stream from the south. Descriptions of the drainage basins of all these streams are given elsewhere in this report.

The drainage basin of this stream is quite similar to that of all such streams which have their source in the mountains and flow across the prairies. The upper part of the basin has considerable fall, with rock and gravel formation and a good growth of timber. In contrast to this the prairie section of the basin is sparsely wooded, except along the banks of the stream, and the rock formation changes to earth; also the stream is more apt to change its channel, especially in times of flood. The high water occurs in the hot months of summer and is caused by the melting of the snow fields in the mountains. The low water occurs in the winter months when there is no melting snow to augment the stream flow.

In addition to the gauging stations on the tributaries, which are taken up in detail elsewhere in this report, there were two stations established on the main stream during the season of 1911, and daily gauge height observations and discharge measurements have since been taken at regular intervals. These stations are located at the cities of Medicine Hat and Saskatoon.

Up to the present the chief value of this stream has been as a source of municipal water supply. There are no irrigation schemes or water power developments on the main stream.

The cities of Medicine Hat and Saskatoon derive their water supply from this stream. The South Saskatchewan is also being considered as a possible source of supply for the cities of Moose Jaw and Regina. In this connection surveys were carried out during 1913 by this Department and also by the Provincial Government.

SOUTH SASKATCHEWAN RIVER AT SASKATOON.

This station was established May 27, 1911, by H. R. Carscallen. It is located at the Canadian Northern Railway bridge in the city of Saskatoon, on the S.W. $\frac{1}{4}$ Sec. 28, Tp.36 Rge. 5, W. 3rd Mer.

The gauge, which is of the standard chain type, is placed on the downstream side of the bridge at chainage 190. The length of chain from the bottom of the weight to the marker is 44.26 feet. The zero of the gauge (elev. 1528.59) is referred to a bench mark (elev. 1553.35), on the side of the downstream end of the left abutment. The latter elevation is referred to a waterworks bench mark (elev. 1571.31 of the City of Saskatoon, located on the top of a hydrant situated approximately 300 feet northeast of the left abutment.

The channel is straight for about 500 feet above and 800 feet below the station. Both banks are high and sandy. The right bank is covered with a dense growth of trees and brush above and below the station. The left bank is clear of brush. The bed of the stream is sandy and shifts.

Discharge measurements are made from the bridge, which is a six-span timber structure supported by cement piers and abutments. The remains of the piers of a former bridge affect velocity observations in their vicinity. Distances are marked on the handrail on the downstream side of th bridge. The face of the left abutment is the initial point for sounding.

During 1913, the gauge was read by James White.

DISCHARGE MEASUREMENTS of South Saskatchewan River at Saskatoon, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 14	O. H. Hoover	316	1,119	1.01	3.13	1,124
Jan. 27	do	331	1,231	1.01	2.88	1,246
Mar. 5–6–7	do	475	2,074	1.20	3.83	2,496
April 28	do	588	4,036	3.90	6.765	15,749
May 26–27	do	605	4,544	3.87	6.69	17,614
June 20	do	782	7,798	4.79	10.17	37,386
July 24	do	691	4,938	3.63	6.60	17,935
Aug. 20	do	727	5,639	4.03	7.27	22,750
Sept. 23	do	448	3,221	3.08	4.32	9,944
Oct. 18	do	441	2,783	2.46	4.21	6,841
Nov. 12	do	446	2,751	2.09	4.34	5,768
Dec. 4	do	441	2,495	1.80	4.47	4,495
Dec. 20	F. R. Steinberger	466	1,970	1.18	4.58	2,328

DAILY GAUGE HEIGHT AND DISCHARGE of South Saskatchewan River at Saskatoon, for 1913

Day	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	3.41	1,425*d*	3.03	1,310	3.79	2,400	4.80*c*	2,550	6.40	15,900	6.65	17,025
2	3.40	1,420	3.04	1,320	3.78	2,410	5.28	3,790	6.04	14,450	7.44	20,700
3	3.42	1,390	3.05	1,320	3.77	2,400	5.00	3,680	5.52	12,370	8.22	24,860
4	3.41	1,370	3.13	1,350	3.77*b*	2,390	5.00	3,670	5.28	11,530	9.32	31,580
5	3.39	1,320	3.23	1,425	3.76	2,390	5.00	3,670	5.17	11,145	9.90	35,500
6	3.32	1,250	3.30	1,580	3.79	2,410	4.90	3,550	5.02	10,620	9.92	35,640
7	3.05	1,170	3.31	1,670	3.84	2,460	4.70*c*	3,380	4.95	10,375	10.02	36,340
8	3.10	1,180	3.37	1,770	3.80	2,496	5.10	3,420	4.76	9,780	10.15	37,250
9	3.06	1,150	3.40	1,830	3.82	2,480	5.30	7,650*d*	4.55	9,150	10.27	38,090
10	3.01	1,130	3.41	1,870	3.84	2,500	5.38	11,880	4.44	8,820	10.16	37,320
11	3.10	1,150	3.48	1,880	3.84	2,520	5.70	3,050	4.34	8,520	10.10	36,900
12	3.10	1,160	3.54	1,900	3.80	2,500	6.04	14,410	4.18	8,040	10.00	36,200
13	3.05	1,150	3.60	1,970	3.80	2,440	8.27*c*	25,135	4.14	7,920	9.95	35,850
14	3.02	1,130	3.64	2,070	3.80	2,440	10.50	37,950	4.09	7,770	9.74	34,380
15	3.11	1,150	3.67*a*	2,125	3.82	2,450	8.05	23,925	4.06	7,680	9.80	34,800
16	3.20	1,180	3.69*b*	2,175	3.82	2,450	6.98	18,510	3.97	7,410	9.90	35,500
17	3.19	1,240	3.70	2,220	3.79	2,420	7.05	18,825	3.92	7,260	10.19	37,530
18	3.18	1,240	3.70	2,250	3.79	2,410	7.39	20,450	3.95	7,350	10 29	38,230
19	3 20	1,250	3.72	2,275	3.77	2,380	8.14	24,420	4.05	7,650	10.23	37,810
20	3.19	1,260	3.74	2,300	3.76	2,370	8.14	24,420	4.16	7,980	10.14	37,180
21	3.16	1,250	3 74	2,320	3.80	2,380	8.16	24,530	4.35	8.550	9 94	35,780
22	3.15	1,250	3.76	2,340	3.82	2,410	8.10	24,200	5.69	13,010	9.74	34,380
23	3.10	1,260	3 76	2,340	3.82	2,420	7.98	23,540	6.97	18,465	9.42	32,230
24	3 05*a*	1,250	3.76	2,360	3.82	2,425	7.81	22,605	7.27	19,850	9.00	29,500
25	2.99	1,250	3.77	2,370	3.82	2,420	7.67	21,850	6.97	18,465	8.83	28,395
26	2 94	1,240	3.77	2,370	3.80	2,410	7 32	20,100	6.75	17,475	8.87	28,020
27	2 88	1,240	3.78	2,375	3.80	2,410	7.02	18,690	6.73	17,385	8 61	27,060
28	2.94	1,240	3.79	2,390	4.10	2,425	6.75	17,475	6.76	17,520	8 52	26,520
29	3 07	1,260	.....	.....	4.10	2,440	6.69	17,205	6.48	16,260	8.48	26,290
30	3.08	1,350	.....	.....	4 20	2,460	6.65	17,025	6.39	15,855	8.47	26,235
31	3.04	1,350	.....	.....	4.27	2,480	.....	.....	6.31	15,495	.....	.....

a Gauge heights from Jan. 24 to Feb. 15 interpolated.
b Gauge heights interpolated from Feb. 16th to March 4th from gauge heights of top of ice.
c Gauge height interpolated.

Daily Gauge Height and Discharge of South Saskatchewan River at Saskatoon for 1913.
(*Concluded*)

Day	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	8.65	27,300	6.07	14,530	5.31	11,635	3.85	7,050	3 30	5,600	4.05	4,950
2	8.60	27,000	6.45	16,125	5.02	10,620	3.78	6,840	3.36	5,750	4 42	4,800
3	8 77	28,020	6.38	15,675	4.91	10,235	3.71	6,630	5.46	1,260	4.44	4,650
4	9 10	30,150	6.30	15,450	4.85	10,050	3.71	6,630	3.95	7,350	4.18	4,530
5	10.75	41,350	6.26	15,290	4.60	9,300	3.84	7,020	4.99	7,240	3 68	4,450
6	10 93	42,710	6.19	15,010	4.71	9,630	3.95	7,350	5.00	7,040	3.73	4,420
7	10.90	42,500	6.07	14,530	4.66	9,480	4.20	8,100	4.79	6,840	4.02	4,410
8	10 25	37,950	5.86	13,690	4.63	9,390	4.11	7,830	4.71	6,600	4.17	4,450
9	9 97	35,990	5.84	13,610	4.65	9,450	4.09	7,770	4.61	6,350	4.20	4,500
10	9 62	33,540	5.70	13,050	4.47	8,910	4.02	7,560	4.50	6,200	4 42	4,590
11	9 15	30,475	5.48	12,230	4.72	9,660	4.14	7,920	4.41	6,200	4 13	4,680
12	8 85	28,525	5.40	11,950	4.78	9,840	4.24	8,220	3 29	6,150	4 20	4,720
13	8 52	26,520	5 35	11,775	4.70	9,600	4 17	8,010	4 06	5,925	4.22	4,730
14	8 08	24,090	5 38	11,880	4.60	9,300	4 12	7,860	3.80	5,580	4 30	4,710
15	7 55	21,250	5.32	11,670	4.49	8,970	4.12	7,860	3.78	5,450	4 40	4,670
16	7 49	20,950	5 41	11,985	4 88	10,140	4 12	7,860	3.73	5,370	4.53	4,700
17	7 50	21,000	5 43	12,055	5.12	10,970	4.20	8,100	3.86	5,380	4 60	4,400
18	7 54	21,200	5 53	12,405	5.06	10,760	4.19	8,070	4.54	5,540	4 55	4,000
19	7 00	18,600	6 53	16,485	4 75	9,750	4.18	8,040	4.75	5,730	4 54	3,350
20	6 98	18,510	7.20	19,500	4.61	9,330	4.20	8,100	4.55	5,770	4 54	2,600
21	6 89	18,105	7.15	19,275	4.49	8,970	4.19	8,070	4.40	5,760	4 60	2,250
22	6 82	17,790	6 99	18,555	4.40	8,700	4.20	8,100	4 41	5,600	4.62	2,190
23	6 62	16,890	7.04	18,780	4 25	8,250	4 24	8,220	4.26	5,290	4.64	2,150
24	6 65	17,025	7 08	18,960	4.10	7,800	4.28	8,340	4.85	5,370	4 63	2,150
25	6.56	16,620	6.94	18,330	4.02	7,560	4.46	8,880	3.58	5,500	4 70	2,180
26	6 38	15,810	6.64	16,980	4 06	7,680	4.43	8,790	3.46	5,525	4 83	2,300
27	6 27	15,330	6.33	15,585	3.94	7,320	4.40	8,700	3.24	5,480	4 95	2,450
28	6 09	14,610	6.09	14,610	3.86	7,080	4.42	8,760	3.12	5,340	5 00	2,690
29	5 90	13,850	5.98	14,170	3 82	6,960	4 46	8,880	3.41	5,200	4 89	3,400
30	5 86	13,690	5.89	13,810	3.82	6,960	4.34	8,520	3.73	5,080	4 51	3,340
31	5.87	13,730	5.56	12,510	.....	.....	3.87	7,110	.....	.....	4.25	3,360

d Ice conditions from Jan. 1st to April 9 and from Nov. 5th to Dec. 31.

Monthly Discharge of South Saskatchewan River at Saskatoon, for 1913

Month.	Discharge in Second-Feet.			Run-Off.
	Maximum.	Minimum.	Mean.	Total in Acre-feet.
January...	1,425	1,130	1,247	76,675
February..	2,390	1,310	1,981	110,019
March....	2,520	2,370	2,432	149,538
April.....	37,950	2,550	15,852	943,260
May.....	19,850	7,260	11,937	733,978
June.....	38,230	17,025	32,436	1,930,076
July.....	42,710	13,690	24,232	1,489,967
August....	19,500	11,670	14,854	913,336
September.	11,635	6,960	9,143	544,046
October...	8,880	6,630	7,909	486,305
November.	12,160	5,080	6,079	361,726
December.	4,950	2,150	3,752	223,259
The year...				7,962,185

Note.—The drainage area for this station would be misleading hence no computations involving the area are made.

SOUTH SASKATCHEWAN RIVER AT MEDICINE HAT.

This station was established May 31, 1911, by H. R. Carscallen. It is located at the traffic bridge in the city of Medicine Hat on the N.W. ¼ Sec. 31, Tp. 12, Rge. 5, W. 4th Mer. The bridge is a five-span structure supported by concrete abutments and piers.

On September 27, 1913, a chain gauge was installed on the traffic bridge crossing this river. The gauge box is fixed to the sidewalk of the downstream side of the bridge, and is situated at the middle of the second span from the right bank. The zero of the gauge (elev. 79.78) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank at the Canadian Pacific Railway bridge, 500 feet upstream. The length of gauge chain from marker to bottom of weight is 40.85 feet.

The channel is straight for about 600 yards above and below the station. The current is moderate and uniform, except in the vicinity of the piers. At these points eddies, and in some cases stretches of backwater, occur, making it difficult to obtain the mean velocity. The banks are high and sandy and clear of undergrowth. The bed is composed of sand and gravel and is liable to shift at high stages of the stream.

Open water measurements are made from the traffic bridge. The initial point for soundings is the stream face of the left or west abutment and is suitably marked on the handrail.

During 1913, the gauge was read by B. H. Solomon, George J. Kroft, E. G. Hitchins and James Mowat.

DISCHARGE MEASUREMENTS of South Saskatchewan River at Medicine Hat, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 13	H. O. Brown	444.0	2,596	0.42	2.59	1,197
Feb. 3–4	do	439.0	2,579	0.82	2.96	2,106
Feb. 18	do	439.0	2,581	0.78	3.15	2,085
Mar. 5–6	do	499.0	2,472	1.38	2.85	1,789
Mar. 31	do	429.0	2,515	0.89	2.96	2,244
April 11	F. R. Steinberger	510.0	4,031	2.11	4.26	9,618
May 6	do	513.5	3,639	1.92	3 33	6,974
May 24	do	641.0	5,290	3.04	5.73	16,083
June 17	do	777.5	6,998	4.10	8.24	28,726
July 8	do	688.0	5,742	3.28	5.36	18,871
July 25	do	592.0	4 310	2.57	4.80	11,884
Aug. 18	do	645.0	5,000	3.24	5.61	16,185
Sept. 9	do	585.0	4,203	2.66	4.51	11,187
Sept. 27–29	do	497.0	3,329	1.73	2.92	5,774
Oct. 18	do	510.0	3,536	1.98	3.34	6,983
Nov. 18	R. Palmer	434.0	2,602	0.88	1.30	2,290
Dec. 23	do	478	2,805	0.72	2.75	2,006

DAILY GAUGE HEIGHT AND DISCHARGE of South Saskatchewan River at Medicine Hat, for 1913.

DAY.	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec-ft..*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	2.37	*a* 2,175	2.94	2,130	3.20	1,885	3.09	2,300	3.83	8,303	9.06	32,936
2	2.35	2,230	2.95	2,125	3.00	1,900	3.11	2,345	3.72	7,970	9.09	33,089
3	2.62	2,100	2.96	2,105	3.10	1,940	3.14	2,380	3.52	7,396	9.25	33,905
4	2.75	1,875	3.05	2,110	3.09	1,830	3.31	2,415	3.38	7,018	9.35	34,415
5	2.52	1,550	3.06	1,730	2.87	1,800	3.42	2,420	3.40	7,070	9.32	34,262
6	2.55	1,380	3.05	1,680	2.95	1,790	3.03	2,380	3.38	7,016	9.18	33,548
7	2.50	1,455	3.05	1,650	2.99	1,705	2.96	2,380	3.30	6,800	9.02	32,732
8	2.80	1,710	3.05	1,640	3.05	1,660	2.94*b*	2,435	3.26	6,692	8.85	31,865
9	2.85	1,750	3.07	1,650	3.20	1,670	3.97	*c* 8,744	3.20	6,530	8.72	31,202
10	2.90	1,740	3.05	1,675	3.30	1,750	3.86	8,396	3.16	6,422	8.65	30,845
11	2.60	1,620	3.09	1,750	3.40	2,010	3.83	8,616	3.24	6,638	9.00	32,630
12	2.68	1,350	3.09	1,840	3.70	2,165	4.44	10,368	3.34	6,908	9.15	33,395
13	2.56	1,195	3.05	1,900	4.15	2,260	5.18	13,372	3.40	7,070	9.26	33,956
14	2.59	1,160	3.05	1,935	4.60	2,370	4.93	12,296	3.60	7,620	9.20	33,650
15	2.55	1,150	3.00	1.980	4.45	2,485	5.46	14,652	4.30	6,810	8.92	32,222
16	2.65	1,145	3.02	2,090	4.06	2,540	5.73	15,960	4.74	11,520	8.73	31,253
17	2.65	1,130	3.05	1,975	4.06	2,550	5.19	13,416	5.31	13,956	8.48	29,978
18	2.70	1,085	3.15	2,025	3.84	2,535	5.19	13,416	5.09	12,977	7.88	26,918
19	2.78	975	3.11	2,050	3.63	2,465	5.07	12,891	5.03	12,719	7.50	24,980
20	2.65	980	3.07	2,115	3.45	2,380	4.85	11,883	5.03	12,719	7.62	25,592
21	2.63	1,030	3.09	2,225	3.30	2,310	4.74	11,520	5.15	13,240	7.35	24,215
22	2.71	1,180	3.30	2,310	3.24	2,245	4.94	12,338	5.00	12,590	7.42	24,572
23	2.67	1,510	3.32	2,350	2.99	2,140	5.08	12,934	4.79	11,720	7.60	25,490
24	2.73	1,900	3.40	2,370	2.94	2,015	5.02	12,676	4.78	11,680	7.55	25,235
25	2.79	2,335	3.05	2,370	2.85	1,885	4.74	11,520	5.29	13,865	7.29	23,909
26	2.90	2,370	3.00	2,280	2.71	1,815	4.37	10,112	5.97	17,177	7.19	23,399
27	2.93	2,350	2.97	2.175	2.65	1,775	4.14	9,306	6.59	20,339	7.15	23,195
28	2.85	2,300	2.95	2,125	2.76	1,805	3.98	8,776	7.18	23,348	7.86	26,816
29	2.87	2,210	.....	.....	3.00	1,860	3.88	8,458	8.00	27,530	8.43	29,723
30	2.70	2,145	.....	.....	3.03	2,050	3.93	8,616	8.67	30,847	8.97	32,477
31	2.76	2,125	.....	.....	3.07	2,240	.....	.....	8.93	32,273	.....	.....

a to b Ice conditions.
c Stream clear of ice.

Daily Gauge Height and Discharge of South Saskatchewan River at Medicine Hat for 1913.—(*Concluded*)

Day	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	8.80	31,610	4.81	11,801	4.06	9,038	2.68	5,184	2.75	5,350	2.28	*e* 4,020
2	8.41	29,621	4.99	12,548	4.36	10,076	2.65	5,115	2.80	5,470	2.48	4,050
3	8.11	28,091	4.78	11,680	4.34	10,004	2.72	5,278	2.76	5,374	3.65	4,070
4	7.90	27,020	4.54	10,742	4.46	10,442	2.74	5,326	2.60	5,000	4.25	4,060
5	7.53	25,133	4.43	10,331	4.39	10,184	2.78	5,422	2.55	4,908	5.15	4,030
6	7.24	23,654	4.42	10,294	4.26	9,720	2.72	5,278	2.72	5,278	4.35	3,990
7	6.92	22,022	4.62	11,048	4.13	9,272	2.74	5,326	2.62	5,046	2.74	3,930
8	6.60	20,390	4.62	11,048	4.15	9,340	2.78	5,422	2.57	4,931	2.75	3,800
9	6.32	18,962	4.59	10,932	4.46	10,442	2.77	5,398	2.58	4,954	2.88	3,700
10	6.16	18,146	4.55	10,780	4.41	10,257	2.76	5,374	2.50	4,770	2.75	3,650
11	6.17	18,197	4.71	11,400	4.21	9,545	2.75	5,350	2.54	4,862	2.60	3,650
12	6.04	17,534	5.61	15,369	4.04	8,972	2.73	5,302	2.50	4,770	2.74	3,720
13	5.85	16,565	6.51	19,931	3.95	8,680	2.71	5,254	2.32	4,361	2.92	3,770
14	5.86	16,616	6.12	17,942	3.85	8,365	2.74	5,326	2.45	4,655	3.43	3,770
15	5.77	16,160	5.76	16,110	3.64	7,736	2.74	5,326	2.19	4,078	3.48	3,720
16	5.62	15,418	5.73	15,960	3.35	6,935	2.83	5,545	1.78	3,208	3.50	3,600
17	5.39	14,324	5.84	16,514	3.16	6,422	3.24	6,638	1.32	2,242	3.52	3,450
18	5.16	13,284	5.77	16,160	2.93	5,801	3.38	7,016	2.08	3,838	3 50	3,200
19	4.94	12,338	5.45	14,605	2.85	5,595	3.36	6,962	2.64	5,092	3.48	2,800
20	4.68	11,282	5.15	13,240	2.82	5,520	3.24	6,638	2.54	4,862	3.50	2,450
21	4.53	10,704	5.28	13,820	2.78	5,422	3.17	6,449	2.65	5,115	2.74	2,250
23	4.44	10,368	4.90	12,170	2.77	5,398	3.08	6,206	2.65	5,115	2.75	2,100
23	4.42	10,294	4.73	11,480	2.81	5,495	3.67	7,823	2.80	5,470	2.80	2,010
24	4.45	10,405	4.53	10,704	2.90	5,720	3.14	6,368	2.70*d*	5,230	2.60	1,980
25	4.70	11,360	4.34	10,004	2.87	5,645	2.86	5,620	2.55*d*	4,885	.....	1,960
26	5.00	12,590	4.14	9,306	2.81	5,495	2.86	5,620	2.40*d*	4,570	2.45	1,930
27	4.96	12,422	4.07	9,071	2.86	5,620	3.76	8,090	2.25	4,210	2.55	1,920
28	4.96	12,422	3.99	8,808	2.92	5,774	3.22	6,584	2.02	3,712	2.75	2,000
29	5.00	12,590	4.01	8,873	2.82	5,520	2.98	5,936	2.18	4,056	2.40	2,220
30	4.90	12,170	3.96	8,712	2.71	5,326	2.88	5,670	2.15	3,990	2.87	2,420
31	4.96	12,422	3.95	8,680	.....	.....	2.70	5,230	.....	.....	2.20	*f* 2,400

d Interpolated.
e to f Ice conditions.

Monthly Discharge of South Saskatchewan River at Medicine Hat, for 1913.

(Drainage area, 20,870 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	2,370	975	1,652	0.079	0.091	101,576
February	2,370	1,640	2,013	0.096	0.100	111,793
March	2,550	1,660	2,059	0.099	0.114	126,599
April	15,960	2,300	8,977	0.425	0.474	535,170
May	32,273	6,422	12,412	0.595	0.686	763,184
June	34,415	23,195	29,747	1.42	1.58	1,770,073
July	31,160	10,294	16,907	0.810	0.934	1,039,574
August	19,931	8,680	12,260	0.587	0.677	753,840
September	10,442	5,326	7,592	0.364	0.406	451,758
October	8,090	5,115	5,873	0.281	0.324	361,114
November	5,470	2,242	4,647	0.223	0.249	276,517
December	4,070	1,920	3,117	0.149	0.172	191,660
The year					5.807	6,482,858

RED DEER RIVER DRAINAGE BASIN.

General Description.

Red Deer River rises in the Sawback Range of the Rockies in the Northern portion of the Rocky Mountain Park, near the boundary between the Provinces of Alberta and British Columbia. It flows eastward for about 40 miles, then northeastward for 70 or 80 miles to a point near Red Deer, Alberta. From here the river flows in a southeasterly and easterly direction to its junction with the South Saskatchewan River just east of the Fourth Meridain, in Tp. 22, Rge. 28, W. 3rd Mer. It has a length of approximately 400 miles.

The valley of the Red Deer is wide and deep, the banks being very rough and cut up with a large number of deep coulees, draining into the river. Near its source the basin is well timbered and a good growth of timber is found along its banks for some distance out into the prairie. Seams of coal, well suited for domestic use, are found in the valley and form the principal source of fuel supply for the settlers along the stream in the prairie section.

The river carries a considerable supply of water at all times of the year, but the volume is subject to sudden variations, due to the melting of snow in the mountains and to heavy summer rains.

Of the tributaries of the Red Deer, the most important are Panther River, near its head, Little Red Deer, entering in Tp. 36, Rge. 1, W. 5th Mer., and Rosebud River, emptying into it in Tp. 28, Rge. 19, W. 4th Mer. In addition, there are innumerable small streams draining into the main river in the western portion of the basin. From the mouth of the Rosebud River eastward there is very little drainage into the river.

Very little water is taken from the Red Deer and its branches for irrigation purposes. There are only a few small schemes on some of the smaller tributaries. The land along the valley, though lacking moisture, is extremely fertile, and with the help of irrigation much of it might be cultivated and fine crops produced. The irrigation of the bench land from the river would be difficult on account of the small fall in the river, the depth of the valley, and the rolling nature of the lands in the drainage basin.

Very little hydrographic work has been done in this basin as yet. A gauging station was established on the Red Deer River near Innisfail, in 1910, but an observer could not be secured and only periodic discharge measurements have been secured at this station. In the Fall of 1911, another gauging station was established at the town of Red Deer, and continuous records have been obtained since then.

Of the tributaries of Red Deer River, Berry and Blood Indian Creeks are the only ones that have been given any attention. These small creeks, which drain into the river in the prairie section, have a few small irrigation rights registered against them and gauging stations were established on them in 1911, but owing to the high cost of obtaining data they were abandoned in 1913.

RED DEER RIVER AT RED DEER.

This station was established December 2, 1911, by J. E. Degnan. It is located at the traffic bridge in the town of Red Deer, on the S.E. ¼ Sec. 20, Tp. 38, Rge. 27, W. 4th Mer.

The gauge, which is of the standard chain type, is fixed to the floor of the bridge at a point about the middle of the north span, on the upstream side of the bridge. The length of the chain from the bottom of the weight to the marker is 29.52 feet. The zero of the gauge (elev. 84.40) is referred to two bench marks on the northwest face of the north abutment at assumed elevations 100.00 and 95.00.

The stream flows in one channel at all stages. This channel is straight for about 600 feet above and 1,300 feet below the gauge. At very high stages the river may overflow the right bank, but not the left, as it is high and steep. The bed of the stream is composed of gravel, but it is firm and not liable to shift.

Discharge measurements are made from the downstream side of the bridge during the open season. The initial point for soundings is a point near the north end of the bridge and is marked on the handrail of the bridge.

During 1913, the gauge was read by C. H. Snell.

Discharge Measurements of Red Deer River at Red Deer, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 14	F. R. Burfield	268	463	0.935	5.13	432
Jan. 30	do	262	455	0.830	5.28	377
Feb. 22	V. Meek	273	477	0.796	5.43	398
Mar. 25	do	317	534	0.860	5.69	408
April 17	do	372	1,785	4.610	7.31	8,235
May 5	G. R. Elliott	221	603	2.260	4.12	1,367
May 9	V. Meek	261	667	2.300	4.38	1,534
May 28	J. S. Wright	340	1,202	3.230	5.78	3,878
June 18	G. J. Smith	271	907	2.840	5.16	2,580
July 16	P. H. Daniells	356	1,359	3.700	6.00	5,031
July 26	do	343	1,216	3.820	5.95	4,649
Aug. 7	do	270	822	3.420	5.13	2,815
Aug. 19	do	331	1,091	3.070	5.47	3,350
Sept. 8	do	268	816	2.670	4.50	2,180
Sept. 18	do	259	671	2.590	4.00	1,543
Sept. 26	do	244	610	2.100	3.77	1,284
Oct. 27	F. R. Steinberger	234	528	1.730	3.52	913
Dec. 6	J. S. Tempest	320	386	1.075	4.45	415
Dec. 15	do	305	338	1.150	4.34	388
Dec. 27	do	210	171	0.600	3.67	103

Daily Gauge Height and Discharge of Red Deer River at Red Deer, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet..*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.10	a 435	532	370	5.52	370	5.69	460	4.16	1,306	5.18	3,964
2	5.01	433	536	368	5.52	395	5.70	485	4.12	1,262	5.77	3,868
3	4.96	430	539	368	5.52	405	5.80	515	4.16	1,306	5.81	3,964
4	5.03	421	535	370	5.52	406	5.94	565	4.20	1,350	5.54	3,334
5	5.00	414	540	380	5.53	405	6.33	600	4.20	1,350	5.64	3,556
6	5.01	416	539	388	5.55	407	7.17	1,500	4.20	1,350	5.66	3,604
7	4.92	420	535	390	5.58	414	8.34	b 2,000	4.23	1,383	5.66	3,210
8	4.96	415	534	393	5.68	415	8.85	3,000	4.35	1,515	5.53	3,313
9	5.04	412	534	398	5.83	415	17.06	4,000	4.46	1,636	5.77	3,868
10	4.99	412	534	404	6.25	414	16.56	5,000	4.56	1,752	5.85	4,060
11	5.08	414	534	410	6.56	417	16.30	6,000	5.35	2,950	6.08	4,638
12	5.14	417	536	416	6.44	d 421	7.07	c 7,467	7.21	7,912	6.11	4,716
13	5.09	425	539	420	6.33	424	7.69	9,477	7.52	8,916	5.89	4,156
14	5.18	432	542	424	6.24	424	7.78	9,774	7.69	9,477	5.78	3,892
15	5.18	436	540	427	6.20	423	7.92	10,236	7.52	8,916	5.65	3,580
16	5.22	435	540	429	5.76	420	7.65	9,345	6.99	7,219	5.37	2,990
17	5.22	433	545	431	5.76	413	7.15	7,720	6.64	6,150	5.26	2,782
18	5.26	430	545	431	5.80	404	6.50	5,750	6.62	6,090	5.18	2,648
19	5.28	420	545	427	5.78	395	6.42	5,526	6.38	5,418	5.19	2,664
20	5.28	414	547	420	5.78	392	6.14	4,794	6.07	4,612	5.44	e3,130
21	5.22	414	548	410	5.67	391	5.94	4,280	5.91	4,205	6.47	5,700
22	5.24	418	543	400	5.67	393	5.63	3,532	5.87	4,108	6.59	6,075
23	5.25	425	547	390	5.68	395	5.25	2,765	5.93	4,255	6.18	5,450
24	5.25	427	547	380	5.69	400	4.90	2 210	5.94	4,280	5.81	4,040
25	5.24	425	536	372	5.67	406	4.69	1,917	5.79	3,916	5.77	3,975
26	5.21	420	550	365	5.70	412	4.52	1,704	5.76	3,844	6.31	5,400
27	5.20	408	550	360	5.66	416	4.43	1,603	5.85	4,060	7.39	8,720
28	5.22	395	556	360	5.66	420	4.41	1,581	5.76	3,844	8.20	11,850
29	5.27	386	.....	.....	5.66	425	4.28	1,438	5.94	4,280	8.60	13,500
30	5.29	377	.....	.....	5.66	430	4.21	1,361	6.09	4,664	8.18	f11,720
31	5.34	373	.....	.....	5.66	440	.....	.....	5.75	3,820	.....	.....

a to b Ice conditions.
b to c Ice breaking up and going out.
d Gauge height interpolated.
e to f Shifting conditions.

Daily Gauge Height and Discharge of Red Deer River at Red Deer, for 1913.
(*Concluded.*)

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	7 98	a 11,960	5.07	2,992	4.79	2,545	3.84	1,364	3.34	892	4.62	555
2	7.83	10,400	5.07	2,992	4.80	2,560	3.86	1,386	3.40	940	4.64	515
3	7.38	8,760	5.07	2,992	4.69	2,396	3.85	1,375	3.56	1,080	4.67	495
4	6.94	7,340	5.05	2,960	4.54	2,192	3.91	1,441	3.51	1,030	4.60	470
5	6.60	6,320	5.13	3,088	4.50	2,140	3.87	1,397	3.52	1,040	4.67	440
6	6.28	5,440	5.01	2,896	5.04	2,944	3.87	1,397	3.36	908	4.37	415
7	6.05	4,980	5.11	3,056	4.66	2,354	3.85	1,375	3.47	996	4.53	420
8	5.98	4,650	5.16	3,136	4.51	2,153	3.83	1,353	3.47	996	4.50	420
9	5.82	4,260	5.24	3,268	4.43	2,049	3.80	1,320	3.44	972	4.30	410
10	5.76	4,120	6.33	5,482	4.43	2,049	3.79	1,310	3.45	980	4.39	410
11	5.64	3,820	6.14	5,042	4.35	1,945	3.77	1,290	3.46	988	4.20	415
12	5.60	3,700	5.79	4,290	4.25	1,820	3.75	1,270	3.50	1,020	4.31	400
13	5.60	3,710	5.72	4,150	4.19	1,749	3.76	1,280	3.32	876	4.45	380
14	5.92	4,500	5.99	4,709	4.13	1,683	3.79	1,310	3.23	804	4.37	365
15	6.08	4,940	5.92	4,562	4.11	1,661	3.81	1,331	3.13	724	4.38	385
16	6 03	4,820	5.84	4,394	4.05	1,595	3.72	1,240	3.30	860	4.26	380
17	6 03	*b*4,840	5.56	3,834	4.01	1,551	3.65	1,170	3.44	972	4.25	370
18	6 02	4,774	5.43	3,594	4.03	1,573	3.65	1,170	3.38	924	4.26	360
19	6 12	4,996	5.47	3,666	3.99	1,529	3.62	1,140	3.40	940	4.24	345
20	6 10	4,950	5.34	3,438	3.99	1,529	3.65	1,170	3.02	640	4.07	315
21	5.98	4,688	5.11	3,056	3.93	1,463	3.62	1,140	.....	*c*640	4.00	280
22	6.02	4,774	4.95	2,800	3.93	1,463	3.63	1,150	.....	*c*630	3.79	250
23	6.63	6,201	4.83	2,608	3.89	1,419	3.61	1,130	4.92	*d*630	3.76	220
24	6.41	5,675	4.75	2,485	3.87	1,397	3.63	1,150	4.90	635	3.61	190
25	6.16	5,088	4.72	2,440	3.83	1,353	3.61	1,130	4.87	645	3.48	160
26	5.89	4,499	4.69	2,396	3.81	1,331	3.54	1,060	5.19	625	3.50	130
27	5.71	4,130	4.61	2,284	3.79	1,310	3.56	1,080	5.11	610	3.59	105
28	5.49	3,702	4.59	2,257	3.76	1,280	3.57	1,090	5.12	595	.....	*c*110
29	5.47	3,666	4.51	2,153	3.76	1,280	3.48	1,004	4.94	585	3.75	125
30	5.40	3,540	4.61	2,284	3.78	1,300	3.47	996	4.92	585	3.86	140
31	5.23	3,251	4.76	2,500	.....	.....	3.35	900	.....	.....	4.03	*e*160

a to b Shifting conditions.
c Discharge's interpolated.
d to e Ice conditions.

Monthly Discharge of Red Deer River at Red Deer, for 1913.

(Drainage area 3862 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	436	373	417	0.108	0.124	25,640
February	431	360	396	.103	.107	21,993
March	440	370	410	0.106	0.122	25,210
April	10,236	460	3,887	1.006	1.123	231,292
May	9,477	1,262	4,101	1.062	1.224	252,160
June	13,500	2,648	4,946	1.281	1.429	294,308
July	11,960	3,251	5,242	1.358	1.566	322,318
August	5,482	2,153	3,284	0.850	0.980	201,925
September	2,944	1,280	1,787	.463	0.516	106,334
October	1,441	900	1,223	.317	.366	75,200
November	1,080	585	825	.214	.239	49,091
December	555	105	327	0.085	0.098	20,106
The year	.....	.....	.....	.....	7.894	1,625,577

BERRY CREEK AT FORSTER'S RANCHE.

This station was established on May 30, 1911, by R. T. Sailman. It is located on the N.W. ¼ Sec. 21, Tp. 23, Rge. 13, W. 4th Mer., about ten miles east of the village of Hutton.

Owing to the excessive cost of obtaining discharge measurements this station was abandoned in 1913.

BLOOD INDIAN CREEK AT HALLAM'S RANCHE.

This station was established on June 26, 1911, by R. T. Sailman. It is located on the S.W. ¼ Sec. 10, Tp. 23, Rge. 8, W. 4th Mer. about one and one-half miles above J. R. Hallam's house and 800 feet downstream from his irrigation dam.

Owing to the excessive cost of obtaining discharge measurements this station was abandoned in 1913.

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Red Deer River Drainage Basin, in 1913.

Date	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. ft.*	*Ft. per sec.*	*Sec.-ft.*
Apr. 16	V. Meek	Blindman River	N.W. 15-39-27-4.	104	509	1.69	860
May 8	do	do	do	98	324	0.35	113
" 27	J.S. Wright	do	do	82	252	0.46	116
June 17	G. J. Smith	do	do	99	388	0.84	325
July 9	H. B. R. Thompson	do	do	98	394	0.63	247
" 17	P. H. Daniel s	do	do	104	674	2.04	1,374
" 28	do	do	do	97	329	0.31	102
Aug. 8	do	do	do	98	320	0.22	70
" 20	do	do	do	100	436	0.93	408
Sept. 6	do	do	do	97	320	0.32	102
" 26	do	do	do	98	301	0.23	71
Oct. 14	G. H. Whyte	do	do	96	311	0.21	67
Dec. 17	J. S. Tempest	do	do	45	35	0.51	17
" 29	do	do	do	35	25	0.41	10

BOW RIVER DRAINAGE BASIN.

General Description.

Bow river rises in lakes Bow and Hector, which are situated in the Rocky Mountains Park, north of the main line of the Canadian Pacific Railway and just east of the Great Divide, and whose elevations are 6,420 and 5,694 feet, respectively, above mean sea level. It flows in a south and easterly direction to the city of Calgary, where it takes a big bend to the south, and then continues in a south and easterly direction to its junction with Belly River at the Grand Forks. Below this point the united stream is known as the South Saskatchewan River.

Bow River has a large number of tributaries in the western portion of its course. Of these, the principal are Cascade and Ghost Rivers draining the northern portion of the basin, and Spray, Kananaskis, Elbow, Sheep, and Highwood Rivers draining the southern portion. Below the mouth of Highwood River very little draining reaches Bow River, and in consequence it depends for its supply almost wholly upon the run-off from the mountains and foothills. As a result, Bow River possesses a normally steady flow throughout the year, but is subject to sudden freshets caused by melting snow and heavy rains in the mountains. The minimum flow occurs in the frozen season, when there is little run-off from the snow fields in the western part of the drainage basin.

The valley of the Bow is deep and well defined throughout its course. In the mountain section it is comparatively narrow and very heavily timbered, while the bed is stony and the banks high and rocky. The nature of the valley changes gradually until, when it reaches the prairie, it is wide, of a clay formation, and devoid of trees, the bed consisting for the most part of gravel. The water is clear and pure.

A large quantity of water is diverted from the Bow River for irrigation purposes. The two chief users are the Department of Natural Resources, Canadian Pacific Railway Company and the Southern Alberta Land Company.

The Department of Natural Resources diverts water at two points, one just east of the City of Calgary and the other three miles southwest of Bassano.. The first system has been in operation for several years and distributes water over the Western section of the Irrigation block which extends east as far as Gleichen. The works at Bassano comprise a very large

earth fill dam and concrete spillway, which were completed in 1913. This system is to serve the Eastern section of the Irrigation block, which extends east from Bassano. In all, it is proposed to irrigate about 1,000,000 acres of land.

The Southern Alberta Land Company have a dam and reservoir near Namaka. These works were practically completed in 1913. It is proposed to irrigate by this system about 300,000 acres.

There are many favourable sites for power development on the Bow River but only one company has up to the present developed power. The Calgary Power Compnay has two plants; one is at Kananaskis Falls at the junction of the Kananaskis and Bow Rivers and two miles east of Kananaskis station; the other is at Horseshoe Falls one mile below. The latter plant has been in operation for some years, and has a capacity of 19,500 horse power. The dam at Kananaskis Falls was completed in 1913 and this plant has a rated capacity of 11,600 horse power. All the power developed is used by the City of Calgary.

The City of Calgary takes its domestic water supply from Elbow River. The intake is about twelve miles southwest of Calgary, above which point the course of the river is through a wild and unset led country, where there is no possibility of human contamination.

The run-off in this drainage basin for 1913 was slightly above the average. No floods occurred during the year. The highest stage on the Bow River at Calgary was in June.

A full description of flood conditions during previous years in the Bow basin may be found on pages 65 and 66 of the Report of Progress of Stream Measurements for 1912.

BATH CREEK NEAR LAGGAN.

This station was established April 9, 1913, by H. C. Ritchie. It is located on the N.E. ¼ Sec. 32, Tp. 28, Rge. 16, W. 5th Mer., on the main line of the Canadian Pacific Railway, one mile west of Laggan station.

The gauge, which is a plain staff graduated to feet an hundredths, is fixed to the downstream end of the right abutment of the steel railway bridge. The zero of the gauge (elev. 89.59) is referred to the downstream corner of the right concrete abutment (assumed elev. 100.00).

The channel is straight for 135 feet above and 110 feet below the station. The left bank is low, sandy and liable to overflow. The right bank is high, rocky, wooded and not liable to overflow. The bed is of clean coarse gravel and is not liable to shift.

Discharge measurements are made 200 feet above the gauge with a current meter by wading. The initial point for soundings is a stake driven into the right bank.

The gauge was read by J. Dickson from May 25th to September 20th. During the remainder of the year there was no observer available.

Measurements made on this stream previous to April 9 will be found under miscellaneous measurements.

DISCHARGE MEASUREMENTS of Bath Creek near Laggan, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 9	H. C. Ritchie.....	17 4	14.9	0.65	2.00	9.6
April 30	do	17 6	16.3	0.62	2.10	10.3
May 27	do	22 8	21.3	3.06	2.70	65.0
June 17	H. B. R. Thompson.	40 5	38.8	3.23	3.10	125.0
July 5	H. C. Ritchie.....	41 0	42.8	3.62	3.32	155.0
July 15	do	41.0	36 1	3 26	2.99	118.0
July 30	do	41 0	38.4	3.33	3.05	128.0
Aug. 13	do	43.0	55.0	4.39	3.48	241 0
Sept. 10	do	41 0	36.1	3.29	3 00	119 0
Sept. 23	do	31.0	24.4	2 45	2.60	60.0
Oct. 10	G. R. Elliott.....	29 0	21.0	2.00	2.36	42.0
Oct. 24	H. C. Ritchie.....	28.0	18.9	1.70	2.30	32.0
Nov. 6	do	27.0	16.7	1 58	2.20	26.0
Nov. 22	do	27 0	15.5	1 19	2.08	18.4
Dec. 5	do	26 0	14.8	1 10	2.05	16.3
Dec. 18	do	26 0	14 1	1.16	2.05	16.7
Dec. 30	do	26 0	14.6	1.07	2.04	15.6

Daily Gauge Height and Discharge of Bath Creek, near Laggan, for 1913

Day.	May.		June.		July.		August.		September.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge	Gauge Height	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*	*Feet.*	*Sec.-ft..*
1	.....	.....	3.09	126	3.87	235	3.26	149	3.05	120
2	.....	.....	3.05	120	3.80	225	3.45	176	2.90	100
3	.....	.....	3.09	126	3.72	214	3.48	180	2.85	93
4	.....	.....	3.07	123	3.50	183	3.53	187	2.93	104
5	.....	.....	3.22	144	3.42	172	3.55	190	3.16	135
6	.....	.....	3.29	154	3.37	165	3.64	203	3.14	133
7	.....	.....	3.35	162	3.60	197	3.64	203	3.00	113
8	.....	.....	3.45	176	3.55	190	3.58	194	2.95	106
9	.....	.....	3.49	182	3.50	183	3.49	182	2.85	93
10	.....	.....	4.02	256	.....a.		3.55	190	2.84	92
11	.....	.....	4.09	266	.....		3.51	184	2.82	90
12	.....	.....	4.13	271	.....		3.54	189	2.80	87
13	.....	.....	4.17	277	.....		3.48	180	2.75	80
14	.....	.....	4.12	270	.....a.		3.55	162	2.70	74
15	.....	.....	3.75	218	2.99		3.26	149	2.65	67
16	.....	.....	3.43	173	2.96	108	3.15	134	2.67	70
17	.....	.....	3.10	127	3.00	113	3.05	120	2.75	80
18	.....	.....	2.97	109	3.05	120	3.00	113	2.76	82
19	.....	.....	3.09	126	3.15	134	2.95	106	2.70	74
20	.....	.....	3.37	165	3.32	158	2.90	100	2.62	64
21	.....	.....	3.45	176	3.38	166	2.87	96	b	.....
22	.....	.....	3.56	191	3.46	177	2.93	104	.....	.....
23	.....	.....	3.65	204	3.55	190	3.11	128	.....	.....
24	b	.....	3.70	211	3.62	200	3.22	144	.....	.....
25	2.73	78	3.67	207	3.64	203	3.20	141	.....	.....
26	2.73	78	3.50	183	3.65	204	3.14	133	.....	.....
27	2.75	80	3.47	179	3.62	200	3.10	127	.....	.....
28	3.12	1.30	3.30	155	3.49	182	3.12	130	.....	.....
29	3.18	1.38	3.56	191	3.32	158	3.16	135	.....	.....
30	3.39	1.68	3.70	211	3.05	120	3.20	141	.....	.....
31	3.75	2.18	.. ....	.....	3.12	130	3.12	130	.....	.....

a Gauge washed out. Disch. interpolated July 10 to 14.
b No observer before May 25 and after Sept. 20.

Monthly Discharge of Bath Creek near Laggan, for 1913.

(Drainage area 30 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (25 to 31)	218	78	127.0	4.23	1.10	1,763
June	277	109	183.0	6.10	6.81	10,889
July	235	108	166.0	5.53	6.38	10,207
August	203	96	152.0	5.07	5.84	9,346
September (1 to 20)	135	64	92.8	3.09	2.30	3,681
The period	.....	.....	.....	.....	22.43	35,886

BOW RIVER AT LAGGAN.

This station was established on July 18, 1910, by J. C. Keith. It was at first located at an old traffic bridge on the N.E. ¼ Sec. 28, Tp. 28, Rge. 16, W. 5th Mer., about one third of a mile west of Laggan. This site did not prove satisfactory and a cable station was therefore established by H. C. Ritchie near the east boundary of the S.E. ¼ Sec. 28, Tp. 28, Rge. 16, W. 5th Mer., on August 30, 1911. The new station is about one half mile southeast of Laggan and 300 feet above the mouth of the Pipestone River.

The gauge, which is of the standard chain type, is situated at the left bank, 8 feet downstream from the cable. The length of the chain from bottom of weight to marker is 11.00 feet. The zero (elev. 89.14) is referred to a permanent iron bench mark (assumed elev. 100.00), situated about 11 feet southeast of the cable tower on the left bank. The elevation of the bench mark referred to Canadian Pacific Railway elevations is found to be 4942.82 feet above mean sea level.

The river flows in one channel at all stages. It is straight for 75 feet above and 200 feet below the station. Both banks are high and not liable to overflow. The right bank is covered with a good growth of spuce but the left is almost clear. The bed of the stream is composed of gravel and boulders but is not liable to shift. The current has a fairly high velocity.

Discharge measurements are made by means of a cable, car, tagged wire and stay wire. The initial point for soundings is the centre of the lower on the left bank, and distances are marked on the measuring wire by tags at five foot intervals.

During 1913, the gauge was read by E. Braund.

DISCHARGE MEASUREMENTS of Bow River at Laggan, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 3	H. C. Ritchie	41.0	61.2	1.12		69
Jan. 16	do	47.0	59.4	0.93		55
Jan. 31	do	44.0	54.4	0.90	4.99	49
Feb. 10	do	47.0	54.4	0.66	4.14	36
Feb. 27	do	48.0	59.0	0.70	4.64	41
Mar. 13	do	49.5	56.0	0.74	4.94	42
Mar. 26	do	49.0	61.2	0.75	5.37	45
April 9	do	50.0	56.6	0.82	5.46	46
April 28	do	45.0	43.0	2.17	4.64	94
May 26	do	70.5	179.0	3.84	6.88	687
June 17	H. B. R. Thompson	71.5	214.0	4.45	7.25	952
July 4	H. C. Ritchie	71.0	206.0	4.81	7.19	991
July 15	do	71.0	184.0	4.37	6.87	804
July 30	do	73.0	217.0	5.01	7.25	1,086
Aug. 13	do	75.0	254.0	5.28	7.80	1,342
Sept. 9	do	70.5	179.0	4.23	6.85	759
Sept. 23	do	63.0	113.0	3.07	5.82	346
Oct. 10	G. R. Elliott	51.0	80.8	2.46	5.22	199
Oct. 24	H. C. Ritchie	49.0	74.8	2.15	5.14	161
Nov. 5	do	46.0	61.9	1.73	4.99	107
Nov. 21	do	45.0	56.5	1.44	4.79	81
Dec. 17	do	77.5	83.2	0.89	5.82	74
Dec. 29	do	73.0	74.7	0.83	5.20	62

Daily Gauge Height and Discharge of Bow River at Laggan, for 1913

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.86	50*b*	4.96	42	4.57	40	5.81	49	4.55	66	7.97	1,467
2	5.94	50	4.71	41	4.60	40	6.00	51	4.46	56	8.05	1,515
3	5.94	50	4.57	40	4.67	40	5.57	47	4.48	58	8.11	1,552
4	5.74	48	4.57	40	4.74	41	5.41	45	4.46	56	8.11	1,552
5	5.74	48	4.79	41	4.74	41	5.40	45	4.46	56	8.02	1,497
6	5.86	50	4.59	40	4.80	41	5.25	44	4.46	56	7.98	1,473
7	5.75	48	4 39	39	4.91	42	5.98	51	4.46	56	7.81	1,369
8	5.73	48	4.38	39	4.87	41	6.08	52	4.45	55	8.19	1,601
9	5.54	46	4.38	39	4.89	41	5.57	47	4.46	56	8.44	1,753
10	5.40	45	4.40	39	4.89	41	5.54	46	5.03	145	8.73	1,930
11	5.22	43	4.40	39	4.86	41	5.60	56	5.12	163	8.74	1,936
12	5.25	44	4.40	39	4.94	42	6.11	78	5.14	168	8.50	1,790
13	4.84	41	4.48	39	5.59	47	5.70	85	5.16	172	8.36	1,705
14	4.90*a*	42	4 46	39	5.38	45	5.09	100	5.18	177	8.24	1,631
15	4.95*a*	42	4.65	40	5.05	42	5.09	128*b*	5.21	183	7.75	1,332
16	5.09*a*	42	4.86	41	4.83	41	4.80*a*	102	5.19	179	7.44	1,143
17	5 05*a*	42	5.06	42	4.72	41	4.64	78	5.31	206	7.21	1,003
18	5.10	42	5.37	45	4.84	41	4.68	83	5.39	226	7.07	918
19	5.04	44	6.09	52	5.15	43	4.80	102	5.38	224	7.34	1,082
20	4.81	41	5.58	47	5.79	49	5.01	141	5.73	322	8.14	1,570
21	4.80	41	5.79	49	6.57	57	5.07	153	5.95	394	7.72	1,314
22	4.80	41	5.73	48	6.31*a*	54	4.94	128	6.15	468	7 51	1,186
23	4.71	41	5.29	44	6.02	51	4.95	128	6.34	545	7.45	1,149
24	4.71	41	5.21	43	5.60	47	4.83	107	6.38	562	7 56	1,217
25	4.60	40	4.98	42	5.54	46	4.76	96	6.57	649	7.48	1,168
26	4.88	41	4.84	41	5.35	44	4.67	82	6.88	803	7.36	1,095
27	4.80	41	4.62	40	5.17	43	4.66	80	7.04	900	7.24	1,021
28	4.70	40	4.63	40	5.01	42	4.64	78	7.41	1,125	7.11	942
29	4.79	41			4.97	42	4.61	73	7.64	1,265	7.26	1,034
30	4 78	41			4.97	42	4.56	67	7.65	1,271	7.35	1,088
31	5.07	42			5.18	43			7.84	1,387		

a Gauge height interpolated.
b Ice conditions Jan. 1st to April 15th.

Daily Gauge Height and Discharge of Bow River at Laggan, for 1913.

Day.	July		August		September.		October.		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	7.43	1,137	7.26	1,034	6.83	779	5.59	281	5.05	149	5.47	71
2	7.50	1,180	7.45	1,149	6.59	658	5.82	350	4.78	99	5.60	72
3	7.36	1,095	7.58	1,229	6.54	635	5.66	301	4.64	78	6.24	78
4	7.16	973	7.62	1,253	7.91	1,430	5.59	281	4.85	111	6.65	82
5	7.05	906	7.58	1,229	7.53	1,198	5.47	248	4.87	115	6.94	85
6	7.05	906	7.79	1,257	7.04	900	5.45	243	4.89	118	7.35	89
7	7.84	1,387	7.74	1,326	6.84	785	5.41	232	4.92	124	7.44	90
8	7.53	1,198	7.63	1,359	6.65	687	5.32	209	4.86	113	7.35	89
9	7.44	1,143	7.71	1,308	6.82	774	5.26	195	4.86	113	7.42	90
10	7.53	1,198	7.48	1,168	6.64	683	5.24	190	4.84	109	7.51	91
11	7.46	1,156	7.52	1,192	6.46	598	5.21	183	4.65	79	7.28	89
12	7.21	1,003	7.70	1,302	6.37	558	5.46	245	4.79	100	7.04	86
13	7.18	985	7.79	1,257	6.37	558	5.54	267	4.60	72	6.74	83
14	7.10	936	7.55	1,210	6.31	532	5.46	245	4.62	75	6.41	80
15	6.85	791	7.26	1,034	6.16	471	5.39	227	4.79	100	6.20	78
16	6.74	732	7.03	994	6.12	456	5 28	199	4.84	109	6.04	76
17	6.66	692	6.82	774	6.06	433	5.24	190	4.86	113	5.85	74
18	6.74	732	6.82	774	6.24	503	5.19	179	4.93	126	6.64	82
19	6.95	847	6.69	707	6.11	452	5.14	168	5.04	147	5 54	71
20	7.27	1,040	6.60	663	6.03	422	5.12	163	5.05	149	5.86	75
21	7.55	1,210	6.52	625	5.96	397	5.12	163	4.84	b 109	5.51	71
22	7.91	1,430	6.52	625	5.89	373	5.05	149	5.02	104	5.48	71
23	7.82	1,375	6.64	683	5.81	347	5 14	168	5 06	98	5.53	71
24	7.85	1,393	6.85	791	5.76	332	5 11	161	5.04	90	5.48	71
25	7.91	1,430	6.94	841	5.68	307	5 06	151	5 07	78	5.23	68
26	7.79	1,257	7.04	900	5.65	298	4.99	137	5 05	66	5.06	67
27	7.67	1,284	7.04	900	5.64	296	5.04	147	5.06	67	5.21	68
28	7.60	1,241	6.94	841	5.60	284	5.02	143	5.10	67	5.23	68
29	7.47	1,162	7.05	906	5.75	329	4.97	133	5.32	69	5 20	68
30	7.20	997	7.05	906	5.64	296	4.93	126	5.13	67	5.25	68
31	7.14	960	7.05	906	.....	.....	4.74	92	.....	.....	5 24	b 68

b Ice conditions Nov. 21 to Dec. 31.

Monthly Discharge of Bow River at Laggan, for 1913.

(Drainage area 163 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage area.	Total in Acre-feet.
January	50	40	44	0.270	0.31	2,705
February	52	39	42	0.258	0 27	2,333
March	57	40	44	0.270	0.31	2,705
April	153	44	81	0 496	0.55	4,820
May	1,387	55	389	2 39	2 76	23,919
June	1,936	918	1,368	8 40	9 37	81,402
July	1,430	692	1,090	6 70	7.72	67,020
August	1,359	625	1,005	6.17	7 11	61,795
September	1,430	284	559	3 43	3 83	33,263
October	350	92	199	1 22	1 41	12,236
November	119	66	100	0 614	0.68	5,950
December	91	67	77	0.472	0 54	4,735
The year	.....	.....	.....	.....	34.86	302,883

PIPESTONE RIVER NEAR LAGGAN.

This station was established August 31, 1911, by H. C. Ritchie. It is located on the S.W. ¼ Sec. 27, Tp. 28, Rge. 16, W. 5th Mer., seven-eights of a mile east of Laggan station, 1,000 feet below the Canadian Pacific Railway bridge and 500 feet above where the stream enters the Bow River.

The gauge, which is of the standard chain type, is supported over the water by two posts set upright in the left bank of the stream, twelve feet south and downstream from the cable. The length of the chain is 10.51 feet from the bottom of the weight to the marker. The zero (elev. 91.54) is referred to a bench mark (assumed elev. 100.00), on an iron spike driven into the side of a spruce tree on the left bank, 22 feet north of the cable. The elevation of the bench mark referred to Canadian Pacific Railway elevations is found to be 4943.77 feet above mean sea level.

The channel is straight for 60 feet above and 100 feet below the station. Both banks are low, but are not liable to overflow. They are covered with low scrub and a sparse growth of spruce. The bed is rocky but fairly smooth at the cross-section. The fall of the stream is considerable and the current is swift.

Discharge measurements are made with a cable, car, tagged wire and stay wire. The initial point for soundings is the centre of the left tower supporting the cable and distances are marked every five feet by tin tags.

During 1913, the gauge was read by E. Braund.

DISCHARGE MEASUREMENTS of Pipestone River near Laggan, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 3	H. C. Ritchie	50.0	43.5	1.05	4.84	46
Jan. 17	do	37.0	25.5	1.64	4.45	42
Feb. 1	do	35.0	28.5	1.37	4.23	39
Feb. 11	do	38.0	20.8	1 82	4.25	38
Feb. 28	do	37.0	28.4	1.12	4.15	32
Mar. 14	do	37.0	27.4	1.00	4.22	27
Mar. 27	do	37.0	27.2	1 10	4 30	30
Mar. 27	do	37.0	27.2	0.85	4 30	23
April 10	do	37.0	30.9	0.91	3.90	28
April 28	do	42.0	35.1	1.61	4 16	56
May 26	do	75.0	134.5	3.94	5 62	663
June 17	H. B. R. Thompson	74.5	125.0	3.93	5.55	492
July 4	H. C. Ritchie	75.0	118.0	3.66	5.50	432
July 15	do	72.0	104.0	3 44	5.29	358
July 30	do	74.0	114.0	3.77	5.35	429
Aug. 13	do	76.0	145.0	5.08	5.83	738
Sept. 9	do	73.5	110.0	3.62	5.39	399
Sept. 23	do	61.5	73.2	2.65	4.78	194
Oct. 10	G. R. Elliott	57.0	56.9	2.28	4.56	130
Oct. 24	H. C. Ritchie	57.0	52.4	1.96	4.52	103
Nov. 5	do	39.0	49.2	1.70	4.60	84
Dec. 4	do	43.0	59.3	1.30	5.51	77
Dec. 17	do	42.0	41.1	1.16	4.95	48
Dec. 29	do	36.0	21.2	1.57	6.03	33

Daily Gauge Height and Discharge of Pipestone River, near Laggan, for 1913

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.86	a 48	4.25	40	4.10	32	4.14	27	4.06	44	6.12	862
2	4.86	47	4.23	40	4.11	32	4.14	27	4.03	40	6.14	874
3	4.84	46	4.21	39	4.14	33	4.14	27	4.05	43	6.17	892
4	4.75	46	4.16	39	4.13	33	4.15	27	3.90	28	6.13	868
5	4.64	46	4.18	39	4.13	34	4.24	28	3.93	31	6.05	818
6	4.61	45	4.16	38	4.17	36	4.15	28	3.95	32	6.01	793
7	4.60	45	4.15	37	4.17	36	4.05	28	4.05	43	5.93	742
8	4.60	45	4.15	37	4.17	35	4.01	28	4.05	43	6.24	937
9	4.65	46	4.20	39	4.14	32	3.95	a 29	4.07	45	6.36	1,013
10	4.60	45	4.20	39	4.07	30	3.92	30	4.48	111	6.55	1,133
11	4.51	44	4.17	38	4.16	29	3.91	29	4.55	127	6.53	1,120
12	4.50	44	4.16	37	4.25	28	3.91	29	4.48	111	6.30	975
13	4.46	44	4.16	37	4.52	28	4.00	37	4.46	107	6.19	906
14	4.46	44	4.10	35	4.43	27	4.02	39	4.45	104	6.15	880
15	4.41	43	4.14	36	4.35	27	4.02	39	4.47	109	5.81	666
16	4.44	43	4.17	37	4.28	27	4.10	48	4.46	107	5.63	556
17	4.41	42	4.18	38	4.20	27	4.19	60	4.55	127	5.55	510
18	4.40	42	4.18	39	4.18	26	4.27	71	4.63	147	5.50	482
19	4.36	42	4.31	40	4.35	25	4.35	85	4.60	139	5.74	623
20	4.35	42	4.20	41	4.38	25	4.60	139	4.83	204	6.22	925
21	4.26	40	4.23	40	4.67	25	4.66	155	4.91	240	5.91	726
22	4.32	41	4.26	39	4.92	26	4.45	104	5.16	322	5.68	586
23	4.28	41	4.21	38	4.80	27	4.36	87	5.28	373	5.65	568
24	4.26	40	4.16	37	4.34	28	4.30	76	5.32	392	5.79	654
25	4.26	40	4.16	36	4.30	28	4.25	68	5.45	456	5.75	629
26	4.27	40	4.14	36	4.25	27	4.23	65	5.60	538	5.66	574
27	4.26	40	4.14	34	4.24	26	4.30	76	5.62	550	5.56	516
28	4.26	40	4.11	32	4.17	25	4.15	54	5.86	698	5.47	466
29	4.25	40			4.15	25	4.12	51	5.90	723	5.64	562
30	4.24	39			4.05	27	4.11	49	5.99	723	5.66	574
31	4.24	39			4.12				6.10	849		

b Ice conditions Jan. 1 to April 9

Daily Gauge Height and Discharge of Pipestone River, near Laggan, for 1913.

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	5.72	610	5.46	461	5.12	306	4.68	160	4.56	52b	5.09	67
2	6.10	849	5.57	521	5.01	265	4.87	216	4.25	57	5.20	65
3	5.53	499	5.58	527	4.98	254	4.71	168	4.18	58	5.49	69
4	5.57	521	5.58	527	6.10	849	4.68	160	4.37	69	5.78	77
5	5.42	440	5.53	499	5.62	550	4.56	219	4.62	84	5.49	70
6	5.42	440	5.64	562	5.37	416	4.59	137	4.58	80	5.67	70
7	5.98	773	5.53	499	5.26	364	4.67	157	4.50	76	5.65	69
8	5.61	544	5.47	466	5.22	347	4.59	139	4.59	85	5.59	69
9	5.54	504	5.79	654	5.39	425	4.57	132	4.70	90	5.62	69
10	5.67	580	5.71	604	5.23	351	4.56	129	4.66	76	5.68	69
11	5.60	538	5.62	550	5.15	318	4.54	125	4.23	54	5.57	63
12	5.40	430	5.75	629	5.11	302	4.70	165	4.61	51	5.46	58
13	5.40	430	5.83	679	5.12	306	4.70	165	4.15	48	5.22	54
14	5.35	406	5.62	550	5.07	287	4.61	142	4.48	48	5.09	52
15	5.28	373	5.47	466	5.00	261	4.57	132	4.83	51	4.99	52
16	5.26	364	5.38	420	4.98	254	4.49	113	4.80	54	4.93	49
17	5.25	360	5.27	369	4.95	244	4.43	100	4.96	58	4.94	48
18	5.37	416	5.30	382	5.09	294	4.52	120	5.13	61	4.97	47
19	5.60	538	5.24	356	4.97	250	4.47	109	5.48	61	4.84	45
20	5.68	586	5.18	330	4.90	226	4.43	100	5.59	57	5.03	44
21	5.74	623	5.18	330	4.88	220	4.55	127	5.74	52	5.09	43
22	5.92	736	5.18	338	4.87	216	4.47	109	5.89	57	5.27	43
23	5.81	666	5.20	373	4.80	194	4.58	134	5.89	60	5.58	41
24	5.79	654	5.36	411	4.78	188	4.52	120	5.97	63	5.49	39
25	5.79	654	5.32	392	4.77	185	4.46	109	5.84	65	6.02	39
26	5.70	598	5.35	406	4.75	179	4.40	94	5.77	65	6.27	39
27	5.63	556	5.33	396	4.72	171	4.47	109	5.59	64	6.38	38
28	5.57	521	5.24	356	4.71	168	4.47	109	5.43	61	6.20	37
29	5.52	493	5.28	373	4.82	200	4.46	107	5.27	61	6.03	33
30	5.35	406	5.27	369	4.71	168	4.20	61	5.26	69	5.97	33
31	5.35	406	5.30	382	.....	.....	4.15	54	.....	.....	5.88	32b

b Ice conditions Nov. 1 to Dec. 31.

Monthly Discharge of Pipestone River near Laggan, for 1913.

(Drainage area 118 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	48	39	43	0.364	0.42	2,644
February	41	32	38	0.322	0.34	2,110
March	36	25	29	0.246	0.28	1,783
April	155	27	55	0.466	0.52	3,273
May	849	28	245	2.08	2.40	15,064
June	1,133	466	748	6.34	7.07	44,509
July	849	406	533	4.52	5.21	32,773
August	679	330	457	3.87	4.46	28,100
September	849	168	292	2.47	2.76	17,375
October	216	54	127	1.08	1.24	7,809
November	90	48	63	0.534	0.60	3,749
December	77	32	52	0.441	0.51	3,197
The year					25.81	162,386

LOUISE CREEK NEAR LAGGAN. (1)

This station was established July 5, 1913, by H. C. Ritchie. It is located on the N.E. ¼ Sec. 20, Tp. 28, Rge. 16, W. 5th Mer., near the Chateau Lake Louise, at the wooden culvert crossed by the Chateau Railway from Laggan station, 500 feet downstream from the outlet of Lake Louise, the source of the stream.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the culvert at the right bank. The gauge is referred to a bench mark at the upstream end of the right timber abutment (elev. 5.92 above the zero of the gauge).

The channel makes a sharp angle immediately at the gauge. Both banks are low but are not liable to overflow. The bed is composed of coarse gravel which is not liable to shift.

Discharge measurements are made with a current meter by wading near the gauge.

During 1913, the gauge was read by Samuel Farquhar.

Water is piped from the lake to the turbines of the Chateau power plant, situated one half mile below this station. Measurements of the tail race, which are given under miscellaneous measurements, show this discharge to remain fairly constant at approximately ten sec. ft. This discharge must be added to obtain the total run-off for the station.

(1) This stream appears in the list of miscellaneous measurements in the 1912 report as Chalet Creek.

Discharge Measurements of Louise Creek near Laggan, in 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 16	H. B. R. Thompson	15.2	14.30	3.09	1.95	44.00
July 5	H. C. Ritchie	15.1	13.90	3.08	1.85	43.00
July 16	do	15.0	11.80	3.20	1.75	38.00
July 31	do	16.0	15.70	3.15	2.00	49.00
Aug. 14	do	27.0	29.00	3.36	2.25	98.00
Sept. 10	do	15.5	16.80	3.36	1.83	56.00
Sept. 24	do	15.8	11.20	2.51	1.60	28.00
Oct. 10	G. R. Elliott	8.0	2.64	0.54	1.03	1.44
Oct. 25	H. C. Ritchie	12.1	5.40	1.56	1.26	8.40

Daily Gauge Height and Discharge of Louise Creek, near Laggan, for 1913.

Day.	July.		August		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.14	81	1 88	50 0	1.53	22 0	1 26	8 6	1.20	6.3
2			2.24	96	1 85	48 0	1 55	21 0	1 27	9 0	1 18	5.8
3			2.26	100	2 21	92 0	1 48	19 3	1 28	9 3	1 16	5.1
4			2.30	106	2 10	76 0	1 46	18 2	1 27	9 0	1.16	5.1
5			2.26	100	2.10	76.0	1.88	50.0	1 27	9.0	1 16	5.1
6			2.32	109	1.91	53.0	1.36	12.9	1 25	8 2	1.15	4.8
7			2.26	100	1 88	50 0	1.28	9 3	1 26	8 6	1 15	4.8
8			2.28	103	1.86	48 0	1 06	2 2	1 26	8 6	1 15	4.8
9			2.19	88	1.84	46 0	1 05	2 0	1 25	8 2	1.15	4.8
10	*a*		2.25	98	1.78	41.0	1 03	1 4	1 25	8.2	1 15	4.8
11	1 94	56	2.26	100	1 52	22 0	1 07	2 5	1 26	8 6	1 15	4.8
12	1 94	56	2.40	122	1 30	10 1	1 15	1 8	1 25	8 2	1 13	4.1
13	1 94	56	2.30	106	1 22	7 1	1 20	6 3	1 26	8 6	1.13	4.1
14	1.82	45	2.27	101	1 16	5 1	1 18	5 8	1 26	8 6	1 13	4.1
15	1 77	40	2.17	86	1 14	15 4	1.18	5 8	1 25	8 2	1 13	4.1
16	1 74	38	2.16	84	1 46	18 2	1 20	6 3	1 25	8 2	1 13	4.1
17	1.74	38	2.05	70	1 68	33 0	1 22	7 1	1 25	8 2	1 14	4.0*b*
18	1 80	43	2.01	64	1 82	45 0	1 22	7 1	1 26	8 6	1 14	4.0
19	1 85	48	2.00	63	1 82	45 0	1 24	7 8	1 25	8 2	1 13	3.9
20	1 98	61	1.90	52	1.78	41 0	1.24	7 8	1 25	8 2	1.13	3.9
21	2 16	84	1.90	52	1 78	41 0	1 24	7 8	1 26	8 6	1 13	3.9
22	2 19	88	1.90	52	1 78	41 0	1 26	8 6	1 25	8 2	1.12	3.8
23	2 18	87	1.92	54	1 70	34 0	1 30	10 1	1 25	8 2	1.12	3.8
24	2 16	84	1.95	58	1 68	33 0	1 30	10 1	1 25	8 2	1 11	3.8
25	2 21	92	1.96	59	1 64	30 0	1 30	10 1	1 23	7.4	1 10	3.7
26	2 20	90	2.09	74	1 58	26 0	1 28	9 3	1 23	7 4	1 10	3.7
27	2 26	100	2.10	76	1 56	24 0	1 25	8 2	1 22	7 1	1 09	3.6
28	2 24	94	2.09	74	1 58	25 0	1 25	8 2	1 22	7 1	1 09	3.6
29	2 15	83	2.10	76	1 55	24 0	1 27	9 0	1 20	6 3	1 09	3.6
30	1 95	58	2.10	76	1 54	23 0	1 27	9 0	1 20	6 3	1 08	3.5
31	2 00	63	2 10	76			1 28	9 3			1 08	3 5*b*

a No observer before July 11.
b Ice conditions Dec. 17 to 31: discharge approximate.

Monthly Discharge of Louise Creek near Laggan, for 1913.

(Drainage area 9 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
July (11 to 31)	100	38	66.9	7.43	5.80	2,787
August	122	52	82.5	9.17	10.57	5,073
September	92	5.1	37.4	4.15	4.63	2,226
October	50	14	10.4	1.16	1.34	640
November	9.3	6.3	8.17	0.908	1.01	486
December	6.3	3.5	4.29	0.476	0.55	264
The period					23.90	11,476

FORTYMILE CREEK NEAR BANFF.

This station was established July 31, 1912, by H. C. Ritchie. It is located at the traffic bridge, on the S.W. ¼ Sec.2, Tp. 26 Rge. 12, W. 5th Mer., on the trail leading from Banff to Castle. It is about a quarter of a mile from the Canadian Pacific Railway depot in Banff and about a mile from tho mouth of the creek.

The gauge, which is a plain staff graduated to feet and hundredths, is driven into the bed of thestream near the left bank, four feet upstream from the bridge, and stayed to two trees. It is referred to a bench mark on the right abutment of the bridge, elevation 8.94 above the zero of the gauge.

The channel is straight for about 50 feet above and 100 feet below the station. Both banks are high and wooded and not liable to overflow. The bed of the stream is of clean sand and gravel and not likely to shift.

Discharge measurements are made from the lower side of the bridge with a current meter and cable. The initial point for soundings is at the left abutment and is marked with a knife cut on the handrail.

During 1913, the gauge was read by J. Anderson who lives 500 feet distant.

Discharge Measurements of Fortymile Creek at Banff, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 21	H. C. Ritchie	26.0	33.1	0.67	3.65	22.0
Jan. 30	do	24.5	40.7	0.66	2 84	27.0
Feb. 17	do	26.0	35.0	0.82	2 55	29.0
Mar. 3	do	25.0	43.7	0.48	2.89	21.0
Mar. 29	do	26.0	42.8	0.47	2.90	19.8
April 13	do	26.0	38.2	0.77	2.47	29.0
April 26	do	27.5	46 2	1.17	2.89	54.0
May 31	H. B. R. Thompson	32.5	132.0	2.59	5.56	343.0
June 19	H. C. Ritchie	32.5	108 0	2 20	4.75	238.0
June 30	do	32.5	109 9	2.15	4 85	236.0
July 18	do	32.5	73.1	1.67	3.73	122.0
Aug. 1	do	31.5	67.8	1.60	3.59	109.0
Aug. 12	do	32.5	73.8	1.64	3 94	129.0
Sept. 4	do	29.0	58.6	1.41	3 38	82.0
Sept. 26	do	28.5	56 9	1 42	3.30	80.0
Oct. 4	G. R. Elliott	28.0	59 0	1 20	3.29	71.0
Oct. 21	do	27.0	54.1	1 05	3 12	57.0
Nov. 8	H. C. Ritchie	27.0	46.6	1.19	3.05	56.0
Nov. 15	do	26.5	42.0	0.96	2 77	49.0
Nov. 29	do	25.5	35.8	0 90	2 65	32.0
Dec. 16	do	25.0	36.2	0 93	2 64	34 0

Daily Gauge Height and Discharge of Fortymile Creek, at Banff, for 1913.

Day.	January		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.30	44*b*	2.60	28.0	2.98	19.5	2.48*a*	23	2.94	49	6.11	426
2	2.72	41	2.68	27.0	3.10	20.0	2.48	23	2.81	42	6.14	430
3	2.75	41	3.40	26.0	2.75	21.0	2.48	23	2.79	42	6.18	436
4	3.30	43	2 85	23.0	2.70	24.0	2.48	23	2.76	40	6.21	440
5	3.05	35	3.00	23.0	2.68	24.0	2.48	23	2.72	39	5.91	396
6	2.85	34	3.12	24.0	2.65	24.0	2.48	24	2.75	40	5.72	367
7	2.98	32	3.17	24.0	2.60	24.0	2.48	24	2.79	42	6.11	426
8	3.10	32	3.30	24.0	2.55	24.0	2.48	24	2.67	37	6.21	440
9	3.20	33	3.38	25.0	2.55	24.0	2.48	24	2.64	36	6 31	456
10	3.25	29	3.38	27.0	2.55	23.0	2.48	25	2 94	49	6.42	472
11	3.46	26	3.35	25.0	2 55	23.0	2.48*a*	25*b*	2 98	52	6 55	492
12	3.60	26	3 60	27.0	2.60	23.0	2 47	29	2.94	49	6 98	556
13	3.72	25	3.32	28.0	2.65	22.0	2 69	37	2.98	52	6.33	458
14	3 70	25	2 70	29.0	2.58	21.0	2.65	36	2.94	49	6.11	426
15	3.76	27	2.65	30.0	2.55	21.0	2 72	39	2.92	48	5.72	367
16	3.80	25	2.65	29.0	2 55	22.0	2 81	42	3.21	67	5.24	297
17	3.80	24	2 63	29.0	3.05	19.2	2 82	43	3.01	54	5 11	278
18	3 80	22	3 12	33.0	3 25	18.2	2 84	44	3.14	62	4 98	260
19	3.72	21	3 05	32 0	3.15	17 5	2 91	48	3 26	70	4 82	240
20	3 65	22	2 60	27 0	3 20a	17.0	3 02	54	3.12	60	5 55	342
21	3.57	22	2 65	27 0	3 25	17 5	3 14	62	3 02	54	5 12	280
22	3.40	24	2 65	21 0	3.30	17.7	3 04	55	2 92	48	5 24	297
23	3.25	21	2 63	23 0	3 35	17.9	2.94	49	3.40	81	4 92	253
24	3.15	26	2 68	19.0	3 40a	18.0	2 85	44	3.60	99	5 91	396
25	2 95	27	2 75	18.0	3 50	18.0	2 82	43	4 12	153	5.42	322
26	2.75	28	2 88	18.2	3 45	18.5	2 86	45	4 42	188	5 65	356
27	2.68	27	2 95	18.5	3 45	19.0	2 84	44	4 61	212	5 32	308
28	2.65	29	2 98	19.0	3.15	19.4	2.92	48	4 83	241	5 12	280
29	2.65	28	.....	...	2 65	19.8	2.87	46	4 92	253	4 92	253
30	2 64	27	.....	...	2 50	20.0	2 74	40	5 12	280	4 85	244
31	2 64	28			2 48	21 0			5 55	342		

a Gauge height interpolated March 20 to 24 and April 1 to 11.
b Ice conditions Jan. 1 to April 11.

Daily Gauge Height and Discharge of Fortymile Creek at Banff, for 1913.—*Concluded.*

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.82	240	3.59	98	3.49	89	3.33	75	3.05	56	2.66	36
2	5.32	308	3.58	97	3.47	87	3.32	75	3.05	56	2.66	36
3	4.92	253	3.56	95	3.40	81	3.31	74	3.05	56	2.66	36
4	4 87	246	3.52	92	3.80	119	3.30	73	3.01	54	2.66	36
5	4.62	214	3.51	91	3.98	138	3.34	76	2.98	52	2.66	36
6	4.32	176	3.49	89	3.92	131	3.36	78	2.97	51	2.67	37
7	4.21	163	3.47	87	3.89	128	3.35	77	2.96	51	2.67	37
8	4.35	180	3.52	92	3.85	124	3.33	75	2.95	50	2.67	37
9	4.38	184	3.87	126	3.81	120	3.32	75	2.92	48	2.66	36
10	4.45	192	3.90	129	3.78	117	3.32	75	2.91	48	2.66	36
11	4 31	175	3.95	135	3.75	114	3.29	72	2.89	46	2.66	36
12	4.23	166	4.05	146	3.67	106	3.28	72	2.85	44	2.65	36
13	4.21	163	4.20	162	3.61	100	3.27	71	2.83	43	2.65	36
14	4.12	153	4.32	176	3.58	97	3.26	70	2.81	42	2.65	36
15	4.02	142	4.34	179	3.56	95	3.24	69	2.77	41	2.65	36
16	3.98	138	4.29	173	3.52	92	3.23	68	2.76	40	2.65	35*b*
17	3.96	136	4.11	152	3.49	89	3.20	66	2.76	40	2.65	35
18	3.91	130	4.02	142	3.57	96	3.10	59	2.76	40	2.65	34
19	3.82	121	3.98	138	3.55	94	2.99	52	2.75	40	2.55	33
20	3.81	120	3.94	133	3.52	92	2.98	52	2.74	40	2.45	32
21	3.80	119	3.89	128	3.50	90	3.05	56	2.73	39	2.65	31
22	4.12	153	3.82	121	3.48	88	3.04	55	2.72	39	2.29	30
23	4.32	176	3.79	118	3.46	86	3.03	55	2.72	39	2.19	28
24	4.39	185	3.73	112	3.43	84	3.09	58	2.71	38	2.09	26
25	4.04	144	3.71	110	3.41	82	3.08	58	2.71	38	2.09	26
26	3.98	138	3.69	108	3.39	80	3.08	58	2.70	38	2.09	26
27	3.95	134	3.68	107	3.37	79	3.07	57	2.68	37	2.13	27
28	3.92	131	3.61	100	3.36	78	3.06	57	2.66	36	2.19	27
29	3.89	128	3.58	97	3.35	77	3.05	56	2.65	36	2.19	27
30	3.78	117	3.55	94	3.34	76	3.05	56	2.65	36	2.13	26
31	3.62	101	3.51	91	.....	.....	3.04	55	2.65	36	2.09	25*b*

b Ice conditions Dec. 16 to 31.

Monthly Discharge of Fortymile Creek at Banff, for 1913.

(Drainage area 58 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	44	21	28.8	0.496	0.57	1,771
February	33	18.0	25.1	0.432	0.45	1,394
March	24	17.0	20.6	0.355	0.41	1,267
April	62	23	37.0	0.638	0.71	2,202
May	342	36	94.5	1.63	1.88	5,811
June	556	244	366	6.31	7.04	21,779
July	308	101	165	2.84	3.27	10,145
August	179	87	120	2.07	2.39	7,378
September	138	76	97.6	1.68	1.87	5,808
October	78	52	65.3	1.12	1.29	4,015
November	56	36	43.8	0.755	0 81	2,606
December	37	25	32.6	0.562	0.65	2,004
The year					21.37	66,180

BOW RIVER AT BANFF.

This station was established May 25, 1909, by P. M. Sauder. It is located at the highway bridge in the village of Banff, about one mile from the Canadian Pacific Railway Station. It is on the quartering line in the S. ½ Sec. 35, Tp. 25, Rge. 12, W. 5th Mer., and is about a mile above the mouth of Spray River, and a short distance below Vermilion lakes.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to the downstream side of the centre pier. The zero (elev. 92.36) is referred to a permanent iron bench mark (assumed elev. 100.00) situated on the right bank 40 feet east of the southern extremity of the bridge.

The channel is straight for about 300 feet above and 400 feet below the station. Both banks are low and are partly covered with brush and timber, but are not liable to overflow The bed is composed of gravel and boulders. There is a deep hole near the right bank, part of which is backwater at low stages. The current is sluggish above the station but increases in velocity until rapids are reached about 300 feet below. Bridge piers divide the stream into four channels.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is one and a half feet from the north end of the bridge; distances are marked on the bottom chord of the downstream side of the bridge at five foot intervals.

During 1913, the gauge was read by N. B. Sanson, Meteorological Observer at Banff.

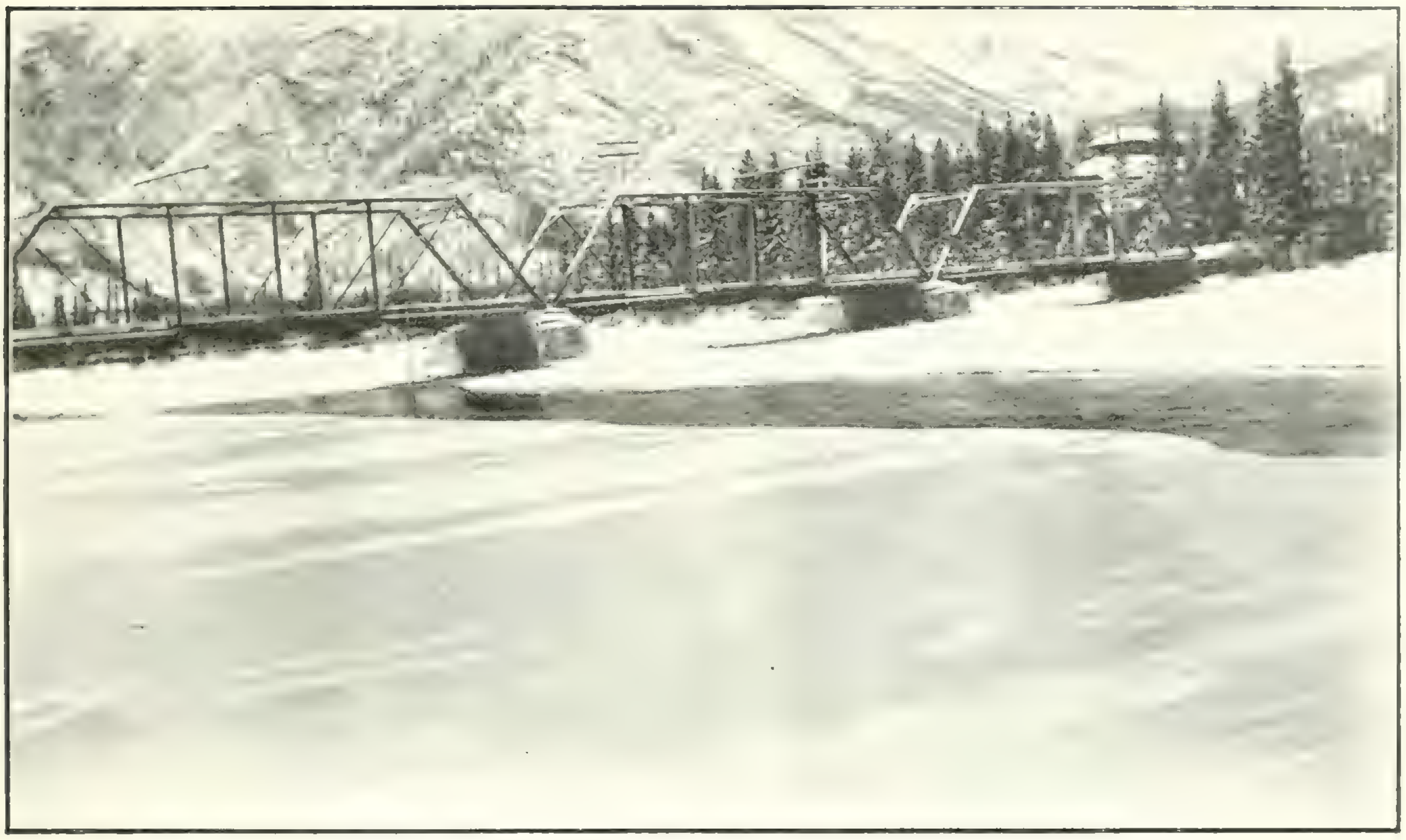
DISCHARGE MEASUREMENTS of Bow River at Banff, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 14	H. C. Ritchie	56.0	155	2.22	0.65	345
Jan. 29	do	57.0	146	2.38	0.85	347
Feb. 12	do	56.0	137	2.17	0.47	297
Feb. 24	do	56.0	157	1.76	0.23	276
Mar. 10	do	54.0	150	1.88	0.18	283
Mar. 25	do	53.0	152	1.73	0.19	263
April 7	do	54.0	148	1.71	0.12	253
April 21	do	197.0	498	1.95	1.26	970
May 2	do	123.0	513	0.98	0.40	504
May 19	do	234.5	734	1.29	1.11	945
May 30	H. C. Ritchie and H. B. R. Thompson	318.5	1,444	3.56	3.40	5,136
June 21	H. C. Ritchie	319.5	1,438	3.42	3.61	4,988
July 7	do	319.0	1,349	3.20	3.25	4,321
July 17	do	308.0	1,080	2.26	2.45	2,439
July 29	do	315.5	1,254	3.04	2.92	3,815
Aug. 16	do	313.0	1,201	2.66	2.69	3,194
Sept. 8	do	311.0	1,109	2.30	2.46	2,549
Sept. 22	do	299.0	944	1.84	1.95	1,740
Oct. 6	G. R. Elliott	267.0	850	1.41	1.60	1,198
Oct. 11	do	253.0	815	1.25	1.42	1,019
Oct. 27	H. C. Ritchie	246.0	728	1.10	1.24	799
Nov. 8	do	200.0	639	1.05	1.00	674
Nov. 20	do	125.0	539	1.12	0.84	602
Dec. 1	do	125.0	519	0.76	0.67	413
Dec. 13	do	88.0	215	2.21	0.70	476
Dec. 27	do	64.0	178	1.97	0.51	351

Daily Gauge Height and Discharge of Bow River, at Banff, for 1913.

Day.	January		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.69	323*b*	0.52	302	0.16	259	0.12	254	0.41	350	3.85	6,125
2	0.69	323	0.46*a*	295	0.15*a*	258	0.11	253	0.38	337	3.87	6,179
3	0.73	328	0.40	288	0.13	256	0.01*n*	239	0.38	337	3.84	6,098
4	0.59	311	0.31	277	0.19	263	0.07	248	0.25	290	3.95	6,395
5	0.50*a*	300	0.32	278	0.17	260	0.07	248	0.28	299	3.86	6,152
6	0.33	280	0.35	282	0.17	260	0.10*a*	252	0.27	296	3.60	5,450
7	0.66	319	0.39	284	0.16	259	0.12	254	0.27	296	3.61	5,477
8	0.67	320	0.39	287	0.19	263	0.02	242	0.29	302	3.97	6,449
9	0.63	316	0.42*a*	290	0.17*a*	260	0.02	242*b*	0.40*a*	345	4.25	7,205
10	0.58	310	0.46	295	0.15	258	0.06	251	0.51	395	4.51	7,907
11	0.56	307	0.45	294	0.17	260	0.13	261	0.88	598	4.62	8,204
12	0.58*a*	310	0.47	296	0.12	254	0.18	271	0.93	630	4.42	7,664
13	0.59	311	0.52	302	0.08	250	0.33	317	0.94	636	4.22	7,124
14	0.65	318	0.51	301	0.11	253	0.46	372	0.96	649	4.09	6,773
15	0.66	319	0.43	292	0.12	254	0.60	440	0.96	649	3.64	5,558
16	0.69	323	0.37*a*	284	0.00	240	0.67	478	0.95	642	3.35	4,775
17	0.73	328	0.31	277	0.08*n*	230	0.73	511	1.09	738	3.03	3,911
18	0.74	329	0.29	275	0.20*n*	216	0.77	533	1.14	775	2.99	3,804
19	0.75*a*	330	0.24	269	0.02*n*	238	0.93	630	1.10	745	3.14	4,208
20	0.77	332	0.26	271	0.08	250	1.16	790	1.24	854	3.72	5,774
21	0.78	334	0.26	271	0.10*a*	252	1.29	896	1.54	1,130	3.68	5,666
22	0.77	332	0.20	264	0.12*a*	254	1.04	703	1.64	1,234	3.32	4,694
23	0.80	336	0.22*a*	266	0.14*a*	257	0.84	574	1.74	1,348	3.30	4,640
24	0.82	338	0.23	268	0.16*a*	259	0.77	533	2.09	1,839	3.36	4,802
25	0.86	343	0.25	270	0.17	260	0.66	473	2.28	2,182	3.46	5,072
26	0.85*a*	342	0.14	257	0.20	264	0.65	468	2.48	2,588	3.42	4,964
27	0.84	341	0.12	254	0.24	269	0.64	462	2.68	3,034	3.25	4,505
28	0.79	335	0.14	257	0.29	275	0.58	430	3.13	4,181	3.14	4,208
29	0.64	317	.....	.....	0.24	269	0.48	381	3.45	5,045	3.25	4,451
30	0.54	305	.....	.....	0.20	264	0.43	358	3.40	4,910	3.24	4,478
31	0.53	304	.....	.....	0.17	260	.....	.....	3.65	5,585	.....	.....

a Gauge height interpolated.
n Negative gauge height.
b Ice conditions Jan. 1 to April 9.



Gauging Station on Bow River at Banff, Alberta, in Winter.



Gauging Station on Forty-mile Creek at Banff, Alberta.

DAILY GAUGE HEIGHT AND DISCHARGE of BOW River, at Banff, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*
1	3.18	4,316	2.60	2,850	2.35	2320	1.70	1,300	1.39	982	0.67	478
2	3.37	4,829	2.72	3,128	2.20	2,030	1.70	1,300	0.79	544	0.46	372
3	3.17	4,289	2.80	3,320	2.10	1,855	1.77	1,384	0.94	636	0.47	376
4	2.58	2,806	2.82	3,370	2.32	2,260	1.74	1,348	1.03	696	0.44	363
5	2.13	1,907	2.82	3,370	3.12	4,154	1.64	1,234	1.05	710	0.38	337
6	2.13	1,907	2.87	3,495	2.81	3,345	1.62	1,212	1.05	710	0.05	390
7	3.18	4,316	2.88	3,520	2.58	2,808	1.55	1,140	1.05	710	0.52*a*	400
8	3.24	4,478	2.97	3,752	2.43	2,483	1.51	1,100	1.00	675	0.54	410
9	3.12	4,154	2.98	3,778	2.45	2,525	1.46	1,052	0.97	655	0.45	367
10	3.16	4,262	2.94	3,674	2.44	2,504	1.44	1,033	1.01	682	0.44	363
11	3.20	4,370	2.84	3,420	2.17	1,977	1.42	1,014	0.92	623	0.54	410
12	2.96	3,726	2.92	3,622	2.21	2,049	1.45	1,043	0.90	610	0.64	462
13	2.78	3,272	3.26	4,532	2.16	1,960	1.57	1,160	1.32	923	0.60	440
14	2.75	3,200	3.07	4,019	2.16	1,960	1.59	1,180	0.58	430	0.64	462
15	2.60	2,850	2.88	3,520	2.06	1,791	1.51	1,100	0.77	533	0.60	440
16	2.51	2,652	2.70	3,080	1.98	1,666	1.45	1,043	0.93	630	0.56	420
17	2.39	2,400	2.54	2,718	1.95	1,622	1.37	968	0.90	610	0.45	367
18	2.39	2,400	2.56	2,762	2.08	1,823	1.37	968	0.89	592	0.42	354
19	2.48	2,588	2.56	2,762	2.07	1,807	1.35	950	0.77	533	0.35	325
20	2.68	3,034	2.40	2,420	1.97	1,652	1.31	914	0.84	574	0.25	290
21	2.87	3,495	2.32	2,260	1.91	1,564	1.28	888	0.62	451	0.40*a*	345
22	3.16	4,262	2.30	2,220	1.95	1,622	1.27	879	0.27	296	0.60	440
23	3.21	4,397	2.30	2,220	1.87	1,511	1.25	862	0.63	456	0.80	550
24	3.19	4,343	2.42	2,462	1.82	1,446	1.31	914	0.81	556	0.76	528
25	3.19	4,343	2.45	2,525	1.78	1,396	1.24	854	0.84	574	0.47	376
26	3.18	4,316	2.47	2,567	1.74	1,348	1.19	812	0.82	562	0.50	390
27	3.11	4,127	2.49	2,609	1.73	1,336	1.23	845	0.78	539	0.43	358
28	2.95	3,700	2.42	2,462	1.72	1,324	1.19	812	0.78	539	0.49	386
29	2.93	3,648	2.38	2,380	1.74	1,348	1.17	796	0.77	533	0.50	390
30	2.67	3,011	2.44	2,504	1.76	1,372	1.02	689	0.76	528	0.49	386
31	2.54	2,718	2.42	2,462	.....	.....	0.89	604	.....	.....	0.49	386

a Gauge height interpolated.

MONTHLY DISCHARGE of Bow River at Banff, for 1913.

(Drainage area 836 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	343	280	321	0.384	0.44	19,738
February	302	254	280	0.335	0.35	15,550
March	275	216	256	0.306	0.35	15,741
April	896	239	412	0.492	0.55	24,516
May	5,585	290	1,395	1.67	1.92	85,770
June	8,204	3,804	5,624	6.72	7.50	334,650
July	4,829	1,907	3,552	4.24	4.89	218,400
August	4,532	2,220	3,025	3.62	4.17	186,000
September	4,154	1,324	2,028	2.42	2.70	120,676
October	1,384	604	1,013	1.21	1.40	62,287
November	982	296	603	0.721	0.80	35,881
December	550	290	399	0.477	0.55	24,534
The year	.....	.....	.....	.....	25.62	1,143,743

SPRAY RIVER NEAR BANFF.

This station was established July 15, 1910, by J. C. Keith. It is located at a traffic bridge about one mile southeast of the village of Banff, on the N.W. ¼ of Sec. 25, Tp. 25, Rge. 12, W. 5th Mer., and about 100 yards above the junction with Bow River.

The gauge, which is of the standard chain type, is nailed to the downstream end of the left or west abutment of the bridge, and projects about five feet over the water. The length of the chain is 14.67 feet from bottom of weight to marker. The zero of the gauge (elev. 88.71) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the left bank 50 feet downstream from the bridge.

The channel is straight for 75 feet above and 100 feet below the station. The right bank is low and may overflow at high stages of the stream. The left bank is steep and high. The bed is composed of coarse gravel and is not liable to shift. From the middle of the section to the right bank, the depth of water decreases at the lowest stages to barely sufficient to cover the gravel. The greatest depth is near the left bank. At the left bank there is a quantity of large rocks which interfers slightly with the accuracy of measurement.

Discharge measurements are made from the downstream side of the bridge with current meter, cable and stay line. The initial point for soundings is the extreme west end of the bottom chord of the bridge.

During 1913, the gauge was read by N. B. Sanson, Meteorological Observer, at Banff.

DISCHARGE MEASUREMENTS of Spray River near Banff, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean. Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 20	H. C. Ritchie	31.0	115.2	1.74	6.21	200
Jan. 28	do	31.0	95.5	1.93	5.80	184
Feb. 8	do	31.5	97.0	1.47	5.90	142
Feb. 25	do	31.0	87.0	1.62	5.52	141
Mar. 11	do	32.5	91.0	1.66	5.73	151
Mar. 28	do	32.5	106.0	1.29	6.12	136
April 8	do	32.5	75.0	2.00	5.10	150
April 25	do	38.5	77.3	3.22	4.96	249
May 3	do	38.0	73.5	3.15	4.87	232
May 28	do	119.5	259.0	5.24	6.77	1,358
June 30	do	119.5	274.2	5.62	6.85	1,543
July 19	do	118.0	198.0	4.85	6.11	952
Aug. 4	do	118.0	241.0	4.10	6.40	987
Aug. 15	do	118.0	231.0	5.24	6.38	1,211
Sept. 6	do	118.0	228.0	5.26	6.46	1,198
Sept. 25	do	115.0	156.0	4.14	5.80	644
Oct. 7	G. R. Elliott	114.0	124.0	3.76	5.56	466
Oct. 23	H. C. Ritchie	112.0	108.0	3.90	5.45	422
Nov. 6	do	77.5	95.9	3.59	5.25	345
Nov. 19	do	42.5	79.9	3.73	5.15	298
Nov. 29	do	42 5	78.0	3.61	5.07	282
Dec. 12	do	37.5	77.2	3.60	5.28	278
Dec. 26	do	28.0	78.8	2.36	5.53	186

Daily Gauge Height and Discharge of Spray River near Banff, for 1913.

Day.	January		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.56	220*b*	5.60	180	5.50	151	5.29	143	4.92	240	7.44	2,420
2	5.72	221	5.50*a*	175	5 55*a*	154	5.37	144	4 90	235	7.41	2,420
3	5.74	222	5.42	170	5.60	156	5.19	146	4.86	227	7.49	2,495
4	5.55	216	5 22	152	5.56	156	5.12	147	4.85*a*	225	7.46	2,450
5	5.48*a*	212	5.10	146	5 41	158	5.11	147	4 84	223	7.35	2,285
6	5.41	210	5.20	140	5.37	154	5.12*a*	146	4 83	221	7 30*a*	2,210
7	6.14	214	5.34	141	5.26	152	5.14	147	4 85	225	7.23	2,105
8	6.39	217	5.72	142	5.46	156	4.96	150	4 85	225	7.40*a*	2,360
9	6.56	214	6.20*a*	148	5.33*a*	150	5.15	152	4 85	225	7 62	2,690
10	6.73	214	6.71	145	5.20	149	5.16	152	4.93	242	7.75	2,885
11	6.94	206	6 37	141	5.73	151	5.10	154	4 96*a*	250	7.80	2,960
12	6.95*a*	207	6.27	150	5.35	154	5.03	156	4 99	258	7.74	2,870
13	6.96	209	6.01	154	5.16	148	5 08*a*	160	5 02	266	7.65	2,735
14	6 93	212	6.06	160	5 23	149	5 14	166	5 05	275	7 61	2,675
15	6.73	206	5.86	154	5.26	152	4.86	171	5 06	278	7.35*a*	2,285
16	6.76	205	5 90*a*	156	5 20*a*	150	4.87	178	5 09	287	7.08	1,880
17	7.02	204	5.95	157	5 13	146	4.78	186	5 09	287	6.81	1,484
18	6.51	202	5 67	152	5 00	143	4.83	194	5 10*a*	290	6 77	1,432
19	6.35*a*	201	6 02	154	5 15	140	4.89	202	5 11	293	6 98	1,730
20	6 19	200	5.76	152	5 24	137	5 00*a*	212	5 16	308	7 37	2,315
21	6.03	198	5 59	150	5 30*a*	136	5.09	222	5 26	341	7 28	2,180
22	6.02	198	5 50*a*	148	5 40*a*	137	5.06*a*	234	5 43	408	7 10*a*	1,910
23	5.77	190	5 40*a*	145	5.50*a*	138	5.04	244*b*	5 65	515	6 90	1,610
24	5.79	190	5 31	143	5 60*a*	139	5 00	260	5 90	655	7 15	1,985
25	5.62	186	5.16	141	5 66	138	4 96	250	6.10*a*	790	7.30	2,210
26	5.56*a*	178	5.71	142	5 45	138	4.97	252	6 30	945	7 00	1,760
27	5.50	176	5 70	146	5 47	137	4.98	255	6 45	1,078	6.89	1,596
28	5.77	184	5 55	148	6 01	136	4.98	255	6 77	1,432	6 80	1,470
29	5.64	180			5 69	140	4 96	250	6 95	1,685	6 80*a*	1,470
30	5.57	180			5 50*a*	146	4 94	245	6 95	1,685	6 79	1,458
31	5.70	182			5 36	144			7.15	1,985		

a Gauge height interpolated.
b Ice conditions Jan. 1 to April 23.

Daily Gauge Height and Discharge of Spray River, near Banff, for 1913.—*Concluded*.

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	6.89	1,596	6.26	913	5.91	661	5.73	556	5.29	352	4.90*a*	235
2	6.81	1,484	6.29	937	5.90	655	5.69	535	5.20*a*	320	4.83	221
3	6.69	1,333	6.32	962	6.06	762	5.69	535	5.14	302	4.86	227
4	6.61	1,242	6.36	996	6.20	865	5.65*a*	515	5.21	324	4.85	225
5	6.65*a*	1,288	6.40	1,030	6.40	1,030	5.65*a*	515	5.23	330	4.92	240
6	6.70*a*	1,345	6.38	1,013	6.47	1 096,	5.63	505	5.20	320	4.99	258*b*
7	6.73	1,382	6.36	996	6.24	897	5.59	485	5.20	320	4.95*a*	265
8	6.60	1,230	6.44	1,068	6.20*a*	865	5.59	485	5.20	320	4.89	268
9	6.50	1,125	6.45	1,078	6.20*a*	865	5.59	485	5.23*a*	330	4.98	270
10	6.53	1,156	6.40	1,030	6.10*a*	790	5.55	465	5.26	341	4.85	266
11	6.50	1,125	6.36	996	6.10*a*	790	5.55	465	5.24	334	5.16	275
12	6.40	1,030	6.34	979	6.00*a*	720	5.58*a*	480	5.20	320	5.10	278
13	6.30*a*	945	6.40	1,030	5.97	700	5.61	495	4.99	258	5.09	266
14	6.20*a*	865	6.36	996	5.93*a*	675	5.59	485	4.97	252	5.08*a*	262
15	6.10*a*	790	6.35	987	5.89	649	5.59	485	5.16	308	5.06	264
16	6.06	762	6.29	937	5.84	619	5.56	470	5.16*a*	308	5.06	235
17	6.07	769	6.31	953	5.80	595	5.51	445	5.15*a*	305	4.87	224
18	6.03	741	6.35	987	5.93	675	5.51	445	5.15	305	4.93	208
19	6.08	776	6.35	987	5.92	668	5.50*a*	440	5.16	308	4.84	194
20	6.20	865	6.30	945	5.85	625	5.46	422	5.10	290	4.89	196
21	6.26	913	6.21	873	5.86*a*	631	5.46	422	4.88	231	4.95*a*	194
22	6.35	987	6.15	828	5.86	631	5.42	404	5.03	269	5.00	192
23	6.38	1,013	6.12	805	5.81	601	5.41	400	5.04*a*	272	5.15	189
24	6.34	979	6.10	790	5.80	595	5.43	408	5.05	275	5.05	186
25	6.34	979	6.05	755	5.79	590	5.39	391	5.12	296	5.28	184
26	6.32	962	6.03	741	5.76	573	5.40*a*	395	5.07	281	5.52	186
27	6.30	945	6.05	755	5.75	568	5.41	400	5.05	275	5.51	190
28	6.28	929	6.06	762	5.74*a*	562	5.33	367	5.05	275	5.25*a*	200
29	6.30	945	5.95	687	5.74	562	5.35	375	5.06	278	5.02	196
30	6.31	953	5.92	668	5.76	573	5.15	305	5.00*a*	260	4.99	194
31	6.12	805	5.92*a*	668	.....	.....	5.05	275	.....	.....	5.29	196*b*

a Gauge height interpolated.
b Ice conditions Dec. 6 to 31.

Monthly Discharge of Spray River near Banff, for 1913.

(Drainage area 305 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	222	180	202	0.663	0.76	12,420
February	180	140	151	0.496	0.52	8,386
March	158	136	146	0.480	0.55	8,977
April	260	143	191	0.627	0.70	11,365
May	1,985	221	535	1.75	2.02	32,896
June	2,960	1,432	2,144	7.03	7.84	127,576
July	1,596	741	1,041	3.42	3.94	64,008
August	1,078	668	908	2.98	3.44	55,831
September	1,096	562	703	2.30	2.57	41,831
October	556	275	447	1.47	1.70	27,485
November	352	231	298	0.978	1.09	17,732
December	278	184	225	0.738	0.85	13,835
The year	.....	.....	.....	.....	25.98	422,342

CASCADE RIVER AT BANKHEAD.

This station was established August 16, 1911, by P. M. Sauder. It is located on the S.E. ¼ Sec. 19, Tp. 26, Rge. 11, W. 5th Mer., at the Bankhead mines. It is located at a foot bridge, 100 feet below an old crib dam and one mile below the dam and reservoir of the Calgary Power Company at Lake Minnewanka.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to the cribbing which supports the north end of the bridge. It is referred to a bench mark on a tree stump on the left bank a few feet downstream from the bridge; elevation above gauge datum, 5.51 feet.

The channel is straight for 100 feet above and below the station. The left bank is low, but not liable to overflow. The right bank is built high by a coal dump. The bed is coarse gravel which is not liable to shift. The current is swift near the left bank and dead at the right bank.

Discharge measurements are made from the downstream side of the bridge with a meter and rods. The initial point for soundings is the left end of the bridge and is marked "O" on the handrail.

During 1913, the gauge was read once each day by J. B. Mackinlay, Accountant at the Bankhead mines.

Abnormal conditions of discharge will be found in the tables due to the effect of the reservoir of the Calgary Power Company above the station.

DISCHARGE MEASUREMENTS of Cascade River at Bankhead, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 20	H. C. Ritchie	51.0	177.5	1.12	4.75	199
Jan. 29	do	50.0	105.0	1.28	2.05	134
Feb. 17	do	52.0	113.0	1.31	2.09	148
Feb. 26	do	51.0	125.0	1.28	2.46	160
Mar. 28	do	52.0	115.0	1.46	2.15	168
April 11	do	52.0	142.0	2.54	2.73	370
April 26	do	53.0	138.0	2.09	2.58	289
May 28	do	41.0	63.3	0.10	1.21	6*a*
June 20	do	53.0	190.5	4.84	3.76	922
July 3	do	51.6	195.4	4.64	3.66	907
July 19	do	52.2	98.8	1.89	1.94	178
July 28	do	53.0	147.0	3.32	2.85	486
Aug. 11	do	57.0	167.0	3.80	3.15	633
Sept. 15	do	53.0	142.0	3.23	2.75	458
Sept. 25	do	52.0	78.4	1.75	1.60	84
Oct. 7	G. R. Elliott	53.0	106.0	1.53	1.96	162
Oct. 21	do	52.5	109.0	2.04	2.19	223
Nov. 3	H. C. Ritchie	53.0	124.0	2.42	2.38	300
Nov. 19	do	52.6	110.0	1.87	2.05	206
Nov. 28	do	53.0	136.0	2.72	2.52	370
Dec. 15	do	53.5	158.0	3.85	3.02	607

a Discharge estimated.

Daily Gauge Height and Discharge of Cascade River, at Bankhead, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	2.33	183*c*	2.04	138	3.00	165	2.53	283	2.99	464	1.24	9
2	2.21	175	2.03	136	2.85	177	2.78	376	2.91	429	1.12	3
3	2.80	164	2.50	133	2.80	180	2.59	304	2.86	409	1.40	25
4	2.70	156	2.80	128	2.75	175	2.60	308	2.77	372	1.89	104
5	3.12	153	3.05	106	2.65	186	2.55	291	2.70	345	3.35	634
6	3.27	158	3.19	115	2.55	180	2.78	376	3.09	508	3.93	929
7	3.45	167	2.99	124	2.49	189	2.75	365	3.09	508	4.07	1,001
8	3.50	177	2.70	128	2.29	209	2.73	357	3.09	508	4.20	1,067
9	3.37	158	2.60*a*	136	2.35	225	2.64	323	3.18	551	4.35	1,144
10	3.35	148	2.50	128	2.35	225	2.81	388	3.16	541	4.47	1,205
11	3.49	140	2.30	128	2.33	225	2.75	365	3.07	499	4.54	1,240
12	3.65	148	2.20	133	2.30	209	2.80*a*	384	3.00	468	4.47	1,220
13	3.82	158	2.10	140	2.68	205	2.84	400	2.92	434	4.42	1,205
14	3 90	175	2.10	153	2.60	194	2.79	380	2.86	409	4.30	1,155
15	4.05	158	2.10	153	2.58	209	2.75	365	2.80	384	4.20	1,120
16	4.10	148	2.10	153	2.59	215	2.73	357	2.65	326	4.10	1,080
17	4.16	140	2.09	150	2.56	206	2.69	341	2.20	180	3.95	1,015
18	4.30	133	2.12	158	2.78	194	2.66	330	2.20	180	3.90	1,005
19	4.68	133	2.16	169	2.67	180	2.65	326	2.20	180	3.78	950
20	4.75	194	2.08	148	2.33	166	2.63	319	2.23	189	3.77	945
21	4.45	225	2.05	140	2.28	153	2.61	312	1.23	8*b*	3.77	945
22	4.18	221	2.51	140	2.26	158	2.60	308	1.29	13	3.72	920
23	4.20	209	2.05	140	2.37	175	2.59	304	1.20	6	3.68	900
24	3.78	205	2.05	140	2.34	180	2.56	294	1.38	23	3.67	895
25	3.45	194	2.08	148	2.28	167	2.61	312	1.56	46	3.74	930
26	3.20	180	2.35	158	2.23	167	2.57	297	1.25	10	3 78	950
27	2.80	167	2.55	153	2.19	167*c*	2.56	294	1.10	3	3.75	935
28	2.40	153	3.04	158	2.15	167	2.56	294	1.13	4	3.73	925
29	2.05	140	.....	.....	2.13	161	2.86	409	1.22	8	3.75	935
30	2.10	153	.....	.....	2.11	156	3.10	513	1.21	7	3.77	945
31	2.00	128	.....	.....	2.09	150	.....	.....	1.24	9	.....	.....

a Gauge height interpolated.
b Water being stored by the Calgary Power Co.; these small discharges only approximate.
c Ice conditions Jan. 1 to March 27.

DAILY GAUGE HEIGHT AND DISCHARGE of Cascade River, at Bankhead, for 1913. *Concluded.*

DAY.	July.		August.		September.		October.		November.		December.	
	Gauge Height	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.77	945	2.87	501	2.39	307	1.69	101	2.13	220	2.75	448
2	3.75	935	2.87	501	2.44	325	1.75	114	2.48	340	2.57	374
3	3.73	925	2.81	501	2.44	325	1.81	127	2 38	404	3.03	576
4	3.63	875	2.85	491	2.56	370	1.84	135	2.35	294	3.19	655
5	3 55	835	2.85	491	2.75	448	1.90	150	2.35	294	3.23	675
6	3.47	795	2.84	487	2.75	448	1.93	158	2.58	377	3.13	625
7	3.39	755	2.79	465	2.82	476	1.96	167	2.52	355	3.37	745
8	2.16	229	2 84	487	2.85	491	1.99	175	2 46	333	3.23	675
9	2 18	235	3.01	566	2.87	500	2 05	194	2 43	322	3.06	590
10	2.31	280	3.12	620	2.87	500	2.03	187	2.41	315	3.30	710
11	2.46	333	3.15	635	2.89	507	2.02	184	2.38	304	3.16	640
12	2.54	362	3.22	670	2.87	500	2.06	196	2.58	377	3.02	571
13	1.87	142	3.69	905	2.86	496	2.12	216	2.53	358	3.35	735
14	1.91	153	3.65	885	2.85	491	2.12	216	2.71	430	3.18	650
15	2 01	181	3.53	825	2.74	443	2.14	222	2.65	405	3.02	571
16	1 69	101	3.52	820	2.69	422	2.14	222	2.65	405	3.36	740
17	1.76	116	3.44	780	2.72	434	2.14	222	2.62	393	3.20	660
18	1 86	140	3.39	755	2.68	418	2.14	222	2.55	366	3.09	605
19	1 94	161	3.28	700	2.68	418	2.14	222	2.05	194	3.83	975
20	2.14	222	3.24	680	2.67	414	2.14	222	2.07	199	3.60	860
21	2 22	249	3.18	650	2.63	397	2.19	239	2.85	491	3.39	755
22	2.44	325	3.13	625	2.66	410	2.16	229	3.49	805	3.25	685
23	1 95	164	3.10	610	2.45	329	2.16	229	3.38	750	3.13	625
24	2 15	225	3.00	561	1.62	88	2.23	252	2.82	478	3 51	815
25	2 24	256	2,96	542	1.61	86	2.18	235	2.72	435	3.30	710
26	2 78	460	2.73	439	1.61	86	2.16	229	2.55	366	3.15	635
27	2 88	505	2.75	448	1.63	90	2.17	232	2.60	385	3.02	571
28	2 88	505	2.72	435	1.63	90	2.15	225	2.52	355	2.93	528
29	2 92	523	2.73	439	1.63	90	2.15	225	2.46	333	2.85	491
30	2.89	510	2.27	266	1.68	99	2.15	225	2.42	318	2.73	439
31	2.87	500	2.36	297	.....	.....	2.13	220	.....	.....	2.65	405

MONTHLY DISCHARGE of Cascade River at Bankhead, for 1913.

(Drainage area 246 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	225	128	166	0.675	0.78	10,207
February	169	106	140	0.569	0.59	7,775
March	225	150	184	0.748	0.86	11,314
April	513	283	342	1.39	1.55	20,350
May	551	3	259	1.05	1.21	15,925
June	1,240	3	878	3.57	3.98	52,245
July	945	101	417	1.70	1 96	25,640
August	905	266	583	2.37	2.73	35,847
September	507	86	350	1.42	1.58	20,826
October	252	101	200	0.813	0.94	12,298
November	805	194	377	1.53	1.71	22,433
December	975	374	637	2.59	2.99	39,168
The year	.....	.....	.....	.....	20.88	274,028

BOW RIVER NEAR KANANASKIS.

This station was established on March 10, 1912, by H. C. Ritchie, to replace the old station near Morley. It is located at the Canadian Pacific Railway bridge on N. W. ¼ Sec. 32, Tp. 24, Rge. 8, W. 5th Mer. The upper dam of the Calgary Power Company, completed November, 1913, is situated one mile below the station at the point where the Kananaskis River enters.

The gauge, which is of the standard chain type, is securely fastened to the inside of the guard rail on the first span from the right bank. The length of the chain from the marker to the bottom of the weight is 18.48 feet. The zero of the gauge (elev. 91.05)is referred to a bench mark (assumed elev. 100.00) on the side of the east pier.

The channel is straight for 600 feet above and 900 feet below the station. The right bank is high and is not liable to overflow, while the left is low and is liable to overflow in high stages of the stream. Both banks have considerable growths of willow and cottonwood. The bed of the stream is of solid rock with fairly smooth and level surface and will not change. The current is fairly swift at this section.

Discharge measurements are made from the bottom chord of the downstream side of the bridge with meter, cable and stay line. At a very low stage measurements may be made by wading. The initial point for soundings is at the left abutment and is marked "O" painted on the bottom chord. Distances from the initial point are painted every ten feet across the bridge.

During 1913, the gauge was read by J. Gipson for the Calgary Power Co.

DISCHARGE MEASUREMENTS of Bow River near Kananaskis, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 7	H. C. Ritchie	290.0	626	1.06	4.50	668
Jan. 24	do	330.0	378	2.03	3.76	777
Feb. 5	do	332.0	355	2.00	3.70	710
Feb. 19	do	345.0	416	1.41	3.53	589
Mar. 5	do	360.0	486	2.19	3.85	1,065
April 2	do	339.0	320	2.54	2.02	813
April 16	do	361.0	397	3.18	2.20	1,259
May 6	do	360.0	362	3.08	2.11	1,113
May 12	do	370.0	436	3.60	2.42	1,573
June 3	H. B. R. Thompson	419.0	1,190	5.33	4.12	6,342
June 26	H. C. Ritchie	415.0	1,129	6.26	4.02	7,060
July 8	do	413.0	1,030	6.23	3.58	6,420
July 22	do	403.0	864	5.95	3.28	5,141
Aug. 5	do	406.0	838	6.13	3.28	5,134
Aug. 26	do	400.0	757	5.59	3.10	4,230
Sept. 16	do	383.0	665	5.10	2.74	3,392
Sept. 30	G. R. Elliott	369.0	559	4.21	2.53	2,351
Oct. 14	do	368.0	511	3.95	2.47	2,016
Oct. 29	H. C. Ritchie	373.0	450	3.58	2.32	1,608
Nov. 11	do	367.0	430	3.39	2.24	1,459
Nov. 25	do	357.0	573	3.31	2.66	1,895

Daily Gauge Height and Discharge of Bow River, near Kananaskis, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.39	b 695	4.05	770	3 84	670	2.03	886	2 29	1,552	3 98	8,200
2	4.14	690	4 03	770	4 06	760	2 01	842	2 24	1,412	4 03	8,422
3	a 4.30	688	3 57	740	4 11	850	2 06	952	2 20	1,300	4 13	8,862
4	a 4.30	683	3 77	700	4 12	950	2.04	908	2 10	1,040	4 15	9,952
5	a 4.40	680	3 72	710	3 89	1,065	2.05	930	2 12	1,092	4 19	9,126
6	a 4.40	673	3 73	720	3 72	1,052	2 11	1,066	2 11	1,066	4 22	9,258
7	4.42	668	3 74	720	2 58	1,038	2 07	974	2 18	1,248	4 10	8,730
8	4.50	690	3 74	720	3 07	1,020	2.09	1,018	2 20	1,300	4 16	8,994
9	4.46	680	3 89	740	2 53	b 1,008	2 00	820	2 24	1,412	4 30	9,610
10	4.40	670	3.80	730	2 08	996	2 15	1,170	2 21	1,328	4 42	10,138
11	4.02	650	3 71	743	2 01	842	2 13	1,118	2 32	1,640	4 49	10,446
12	3.95	655	3 75	757	1 99	805	2 10	1,040	2 42	1,944	4 56	10,752
13	3.89	658	4.73	770	1 93	715	2 17	1,222	2.45	2,040	4 65	11,150
14	3.71	660	4 00	760	1 90	670	2 21	1,328	2 33	1,670	4 43	10,182
15	3.70	658	4 10	750	1 96	760	2 20	1,300	2 41	1,912	4 31	9,654
16	3.74	652	3 80	740	2 06	952	2 23	1,384	2 39	1,850	4 27	9,474
17	3.75	648	3 57	730	2 10	b 900	2 19	1,274	2 45	1,040	4 05	8,510
18	3.79	643	3 56	660	2 35	860	2 20	1,300	2.45	2,040	3 89	7,705
19	4.00	640	3 53	589	2 47	800	2 13	1,118	2 43	1,976	3 69	6,895
20	3.89	650	3 64	585	2 40	750	2 38	1,820	2 42	1,944	3 90	7,840
21	3.71	730	3 60	580	2 43	755	2.44	2,008	2 40	1,880	4 16	8,994
22	3.67	720	2 32	570	2 33	760	2.38	1,820	2 49	2,168	4 04	8,466
23	3.68	750	3 58	573	2 37	755	2 32	1,640	2 51	2,234	3 90	7,840
24	3.76	777	3 52	572	a 2 35	750	2 27	1,496	2 60	2,540	4 01	8,334
25	3.77	780	3 47	571	2 33	750	2 29	1,552	2 76	3,156	4 07	8,598
26	3.80	785	3 49	570	a 2 32	755	2 30	1,580	2 89	3,583	4 03	8,422
27	3.74	788	3.53	577	a 2 31	760	2 27	1,496	3 13	4,510	3 97	8,155
28	3.76	790	3 59	590	a 2 30	810	2 21	1,328	3 12	4,470	3 81	7,435
29	3.86	783	.....	.....	a 2.30	810	2.29	1,552	3 55	6,270	3 71	6,985
30	3.80	778	.....	.....	a 2 30	812	2 31	1,610	3 92	7,930	3 75	7,165
31	3.82	770	.....	.....	2.30	b 815	.....	.....	4.02	8,378		

a Gauge height interpolated.
b Ice conditions Jan. 1 to March 9 and March 17 to 31.

DAILY GAUGE HEIGHT AND DISCHARGE of Bow River, near Kananaskis, for 1913. *Concluded*

DAY.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.84	7,570	3.23	4,913	a 2.98	3,924	2.55	2,370	2.24	1,412	2.70	1,660
2	3.93	7,975	3.26	5,036	2.83	3,361	a 2.58	2,472	2.29	1,552	2.53	1,540
3	3.81	7,435	3.30	5,200	2.79	3,214	2.60	2,540	2.14	1,144	2.51	1,520
4	3.62	6,580	3.50	6,050	2.82	3,324	2.68	2,820	2.16	1,196	2.50	1,500
5	3.39	5,578	3.26	5,036	3.26	5,036	2.58	2,472	2.14	1,144	2.53	1,510
6	3.42	5,706	3.29	5,159	3.38	5,536	2.46	2,072	2.18	1,248	2.56	1,520
7	3.49	6,007	3.37	5,494	3.21	4,831	2.48	2,136	2.23	1,384	2.58	1,530
8	3.62	6,580	3.43	5,749	3.09	4,351	2.47	2,104	2.28	1,524	2.80	1,540
9	3.42	5,706	3.49	6,007	3.07	4,273	2.60	2,540	2.26	1,468	a 2.85	1,580
10	3.47	5,921	3.54	6,226	3.11	4,430	2.40	1,880	2.35	1,730	a 2.90	1,586
11	3.41	5,663	3.44	5,792	3.03	4,117	2.39	1,850	2.37	1,790	2.93	1,592
12	3.37	5,494	3.51	6,094	2.93	3,734	2.40	1,880	2.17	1,222	2.84	1,600
13	3.34	5,368	3.59	6,446	2.87	3,509	2.40	1,880	2.24	1,412	2.81	1,580
14	3.20	4,790	3.54	6,226	2.84	3,398	2.44	2,008	2.26	1,468	2.60	1,540
15	3.18	4,710	3.50	6,050	2.81	3,287	2.55	2,370	2.15	1,170	2.61	1,440
16	3.01	4,039	3.41	5,663	2.76	3,106	2.48	2,136	2.24	1,412	2.42	1,260
17	2.97	3,886	3.43	5,749	2.71	2,926	2.45	2,040	2.24	1,412	2.40	1,250
18	2.89	3,583	3.32	5,284	2.67	2,785	2.46	2,072	2.20	1,300	2.43	1,220
19	2.91	3,658	3.23	4,913	2.86	3,472	2.44	2,008	2.54	b 1,740	2.91	1,220
20	2.87	3,509	3.17	4,670	2.90	3,620	2.40	1,880	2.43	1,660	3.12	1,240
21	2.96	3,848	3.00	4,000	2.87	3,509	2.36	1,760	2.55	1,760	3.15	1,260
22	3.27	5,077	3.02	4,078	2.84	3,398	2.37	1,790	2.24	1,500	3.45	1,240
23	3.51	6,094	2.98	3,924	2.69	2,855	2.25	1,440	2.34	1,580	2.81	1,220
24	3.59	6,446	3.02	4,078	2.62	2,610	a 2.28	1,524	2.70	2,000	3.95	1,200
25	3.53	6,182	3.02	4,078	2.53	2,302	2.34	1,700	2.50	1,900	4.65	1,260
26	3.60	6,490	3.09	4,351	2.48	2,136	2.37	1,790	2.60	1,940	5.43	1,320
27	3.41	5,663	3.04	4,156	2.43	1,976	2.45	2,040	2.30	1,500	5.02	1,280
28	3.31	5,242	3.00	4,000	2.45	2,040	2.44	2,008	2.28	1,480	5.05	1,290
29	3.44	5,792	2.97	3,886	2.43	1,976	2.30	1,580	a 2.40	1,550	5.35	1,280
30	3.41	5,663	2.93	3,734	2.56	2,404	2.31	1,610	2.50	1,620	5.34	1,285
31	3.37	5,494	3.12	4,470	.....	.....	2.45	2,040	.....	.....	5.45	b 1,290

a Gauge height interpolated.
b Ice conditions Nov. 19 to Dec. 31.

MONTHLY DISCHARGE of Bow River near Kananaskis, for 1913.

(Drainage area 1601 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	790	640	703	0.439	0.51	43,226
February	770	570	679	0.424	0.44	37,710
March	1,065	670	839	0.524	0.60	51,588
April	2,008	820	1,285	0.083	0.90	76,463
May	8,378	1,040	2,546	1.58	1.82	156,547
June	11,150	7,165	8,776	5.48	6.11	522,210
July	7,975	3,509	5,540	3.46	3.99	340,640
August	6,446	3,734	5,049	3.15	3.63	310,453
September	5,536	1,976	3,381	2.11	2.35	201,183
October	2,820	1,440	2,026	1.26	1.45	124,570
November	2,000	1,144	1,507	0.941	1.05	89,673
December	1,660	1,200	1,398	0.873	1.01	85,960
The year	.....	.....	.....	.....	23.86	2,040,223

KANANASKIS RIVER NEAR KANANASKIS.

This station was established August 31, 1911, by P. M. Sauder. On May 13th, 1913, the station was moved by H. C. Ritchie to its present position one and one half miles upstream, on account of backwater from the Calgary Power Company's new dam. The station is located on the S.W. ¼ Sec. 34, Tp. 24, Rge. 8, W. 5th Mer., one and one-half miles above the junction with the Bow River. The upper dam of the Calgary Power Company, completed November, 1913, is situated immediately below the junction of the two rivers and is two miles east of Kananaskis station.

The gauge, which is of the standard chain type, is supported on posts at the right bank, 60 feet upstream from the gauging section. The length of the chain is 11.10 feet from bottom of weight to marker. The zero of the gauge (elev. 88.17) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank between the gauge and the cable tower.

The channel is straight for 400 feet above and 700 feet below the station. Both banks are high, wooded and not liable to overflow. The channel at the station is of coarse gravel and very uniform; below the station it is somewhat rocky. The current is swift; at low stages there is backwater at the left bank.

Discharge measurements are made with a current meter and rods by means of a cable and car. The initial point for soundings is the centre line of the tower on the left bank. Distances are marked every five feet by a tagged wire stretched between the cable towers.

During 1913, the gauge was read by J. Gipson for the Calgary Power Company.

DISCHARGE MEASUREMENTS of Kananaskis River, near Kananaskis, for 1913.

Date.	Hydrographer.	Width.	Area. Of section.	Mean. Velocity.	Gauge Height.	Discharge
		Feet.	*Sq. ft.*	*Ft per. sec.*	*Feet.*	*Sec.-ft.*
Jan. 7	H. C. Ritchie	61.0	150.4	0.89	6.33	134
Jan. 23	do	60.0	86.0	2.27	6.08	195
Feb. 4	do	60.0	78.5	1.89	5.44	148
Feb. 18	do	60.0	73.5	2.46	5.78	180
Mar. 4	do	60.0	65.5	2.22	5.97	145
April 1	do	55.0	61.2	1.83	5.57	112
April 15	do	58.0	81.2	1.98	5.20	161
May 13*a*	do	105.0	210.0	1.16	4.98	244
June 4	H. B. R. Thompson	125.0	401.0	4.75	6.85	1,909
June 24	H. C. Ritchie	123.0	414.6	3.61	6.66	1,496
July 9	do	123.0	374.1	3.52	6.32	1,316
July 23	do	122.0	369.0	3.41	6.32	1,260
Aug. 6	do	122.0	363.0	3.53	6.25	1,281
Aug. 27	do	122.0	335.0	3.38	6.14	1,132
Sept. 17	do	118.0	295.0	2.85	5.80	841
Oct. 1	G. R. Elliott	116.0	274.0	2.45	5.68	670
Oct. 15	do	110.0	254.0	2.02	5.45	512
Oct. 28	H. C. Ritchie	110.0	223.0	1.65	5.28	369
Nov. 10	do	108.0	214.0	1.47	5.16	314
Nov. 24	do	107.0	211.0	1.28	5.06	269
Dec. 8	do	105.0	202.0	1.09	4.99	220

a This and succeeding measurements made at new station.

DAILY GAUGE HEIGHT AND DISCHARGE of Kananaskis River, near Kananaskis, for 1913.

DAY.	January.		February.		March		April.		May.		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	7 06	c 187	5 78	180	5.84	140	5 57	112	4.85	183	6.75	1,703
2	7.36	185	5 71	175	6.25	142	5.60	122	4 87	190	6.84	1,787
3	7 03	175	5 47	150	6.22	144	5.80	130	a 4.86	186	6.78	1,731
4	6.97	175	5.40	148	5.99	145	6.91	145	4.84	180	6.84	1,787
5	6.72	160	5.42	150	5.77	155	6.89	142	4.82	173	6.85	1,796
6	6.52	145	5.67	160	5.68	160	6 75	140	4 88	193	6.83	1.778
7	6.33	134	5.60	175	5.77	165	6 50	140	4.86	186	6 80	1,750
8	7.50	155	5 57	178	5.72	170	6.42	155	a 4.86	186	6.83	1,778
9	7.24	155	5.56	180	5.68	165	6.71	168	4.86	186	7.00	1,936
10	7 42	155	5.50	185	5 67	160	6.55	175	4 90	200	7.23	2,150
11	6.56	145	5 55	180	5 58	155	5.82	175	4.94	216	a7.16	2,085
12	7.43	155	5 53	183	5.48	150	5.13	175	4 95	220	7.10	2,029
13	6 79	150	5 56	185	5.25	150	5.10	169	4.98	232	6.95	1,889
14	7 08	150	a 5 60	188	5.00	150	5 14	164	5.00	240	6.82	1,769
15	6.47	145	a 5 65	190	5.53	148	5.19	161	5.01	245	6.72	1,676
16	7.60	155	a 5.70	187	5.37	145	5.30	170	5.03	254	6.55	1,517
17	5 98	150	a 5.70	184	5.52	140	5.32	180	5.06	268	6.52	1,490
18	6.12	150	5 78	183	5 28	130	5 37	c 190	5.07	272	6.43	1,406
19	6.04	150	5.51	180	5.22	125	b 4.91	204	5.09	281	6.51	1,480
20	5 88	165	5.64	180	5.34	115	4.98	232	5.10	286	6.64	1,601
21	6.00	175	5.67	170	5 30	115	5 04	258	5.19	335	6 62	1,683
22	5.98	185	5.36	165	5.54	120	5 02	249	5.27	383	6.57	1,536
23	6.08	195	5 53	160	5.41	120	4.94	216	5.50	550	a 6.60	1,564
24	5.70	190	5.39	160	5.52	118	4.90	200	5 67	700	5.62	1,683
25	6.00	192	5.14	150	5.20	117	4 89	197	5.81	829	6.73	1,685
26	6.10	195	5.31	145	a5.40	116	4.91	204	5.97	978	6.71	1,666
27	6.05	193	5.33	140	5.67	115	4.88	193	6.07	1,071	6.67	1,629
28	6.02	190	5.59	140	5.74	115	4.89	197	6.34	1,322	6.61	1,573
29	5.99	188			5.62	114	4.87	190	6.52	1,490	6 62	1,583
30	5 90	185			5.76	113	4 89	197	6 61	1,573	6 67	1,629
31	5.92	185			5.67	112			6 69	1,648		

a Gauge height interpolated.
b Reading commenced at new stations.
c Ice conditions Jan. 1 to April 18.

SESSIONAL PAPER No. 25c

Daily Gauge Height and Discharge of Kananaskis River, near Kananaskis, for 1913. *Concluded.*

Day.	July.		August.		September.		October.		November		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height	Discharge	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet*	*Sec-ft..*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1	6.58	1,545	6.14	1,136	a 6.06	1,099	5.65	682	5.18	329	5.05	263
2	6.51	1,480	6.11	1,108	6.08	1,080	a 5.68	709	5.20	340	5.06	268
2	6.43	1,406	6.31	1,294	6.05	1,052	5.71	736	5.10	286	5.08	277
4	6.39	1,369	6.34	1,322	6.01	1,015	5.73	755	5.16	318	5.04	258
5	6.34	1,322	6.27	1,257	6.69	1,648	5.74	764	5.18	329	5.04	258
6	6.44	1,415	6.26	1,248	6.78	1,731	5.63	663	5.17	324	5.08	277
7	6.38	1,359	6.29	1,276	6.43	1,406	5.58	618	5.16	318	5.06	268
8	6.31	1,294	6.37	1,350	6.31	1,294	5.55	593	5.14	308	5.04	258
9	6.27	1,256	6.47	1,443	6.21	1,229	5.65	682	5.18	329	a 5.00	240
10	6.30	1,285	6.52	1,490	6.15	1,145	5.47	527	5.16	318	a 4.95	220
11	6.34	1,322	6.73	1,685	6.09	1,090	5.44	503	5.18	329	4.90	200
12	6.31	1,294	6.64	1,601	6.00	1,006	5.43	495	5.16	318	4.92	208
13	6.26	1,248	6.71	1,666	5.96	969	5.40	472	5.19	335	4.94	216
14	6.19	1,183	6.66	1,620	5.93	941	5.49	542	5.15	313	4.95	220
15	6.12	1,118	6.53	1,499	5.90	913	5.48	532	5.18	329	4.99	236
16	6.07	1,071	6.47	1,443	5.85	866	5.45	511	5.20	340	4.95	220
17	5.95	959	6.53	1,499	5.82	839	5.37	451	5.18	329	4.94	216
18	5.92	932	a 6.44	1,415	5.90	913	5.34	430	5.15	313	4.93	212
19	5.90	913	6.34	1,322	5.94	950	5.34	430	5.16	318	5.19	c 210
20	5.95	959	6.20	1,192	5.90	913	5.36	444	5.15	313	5.29	209
21	6.07	1,071	6.16	1,155	5.86	876	5.30	402	5.10	286	5.63	208
22	6.31	1,294	6.03	1,034	5.70	727	5.35	437	5.10	286	5.91	206
23	6.43	1,406	6.05	1,052	a 5.75	773	5.30	402	5.10	286	5.50	205
24	6.37	1,350	6.01	1,043	5.80	820	5.29	396	5.06	268	5.61	200
25	6.29	1,276	6.01	1,015	5.77	792	a 5.29	396	5.08	277	5.62	203
26	6.25	1,238	6.08	1,080	5.71	736	5.29	396	5.10	286	5.78	205
27	6.27	1,257	6.09	1,090	5.70	727	5.27	383	5.06	268	5.81	207
28	6.20	1,192	6.03	1,034	5.67	700	5.29	396	5.08	277	6.12	208
29	6.32	1,304	6.06	1,062	5.70	727	5.25	371	a 5.06	268	6.11	210
30	6.28	1,267	6.01	1,043	5.68	709	5.10	286	5.01	258	6.13	205
31	6.21	1,201	6.13	1,127	.....	.....	5.16	318	.....	.....	6.92	c 203

a Gauge height interpolated.
c Ice conditions Dec. 19 to 31.

Monthly Discharge of Kananaskis River near Kananaskis, for 1913.

(Drainage area 395 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	195	134	168	0.426	0.49	10,330
February	190	140	169	0.428	0.45	9,386
March	170	112	136	0.345	0.40	8,362
April	258	112	178	0.451	0.50	10,592
May	1,648	173	492	1.25	1.44	30,252
June	2,150	1,406	1,712	4.34	4.84	101,870
July	1,545	913	1,245	3.15	3.63	76,550
August	1,685	1,015	1,277	3.23	3.72	74,830
September	1,731	700	989	2.50	2.79	58,850
October	764	286	507	1.28	1.48	31,174
November	340	258	306	0.775	0.86	18,208
December	277	200	226	0.572	0.66	13,896
The year					21.26	444,130

GHOST RIVER AT GILLIES' RANCHE.

This station was established on August 17, 1911, by L. R. Brereton. It is located on the N.E. ¼ Sec. 23, Tp. 26, Rge. 6, West of 5th Mer., opposite Gillies' ranche buildings and one mile above the highway bridge which crosses the stream just above its junction with the Bow River

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream at the left bank. The zero of the gauge (elev. 90.87) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank of the river 270 feet due north of the quarter mound on the east boundary of Sec. 23, Tp. 26, Rge. 6, W. 5th Mer., and 469 feet east and slightly south of the gauge.

The channel curves just above the gauge but is straight for 200 feet below. The right bank is a steep clay cut bank and will not overflow. The left is low, gravelly and slightly wooded and will not overflow. The bed of the stream is uniform and is composed of gravel which may shift at high stages.

Discharge measurements during high water are made at the highway bridge below. The initial point for soundings is the face of the right abutment. At low stages the stream is waded near the gauge.

During 1913, the gauge was read by Miss E. Gillies.

DISCHARGE MEASUREMENTS of Ghost River at Gillies' Ranche, in 1913.

Date.	Hydrographer	Width	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sec.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 9	H. C. Ritchie	.....	.....	.....	2.54	*a*
Jan. 25	do	45.0	78.0	1.76	2.10	137
Feb. 6	do	45.0	64.7	2.12	1.42	137
Feb. 20	do	40.0	59.5	2.14	1.40	127
Mar. 6	do	40.0	54.5	2.29	1.22	125
April 3	do	38.0	50.6	1.74	0.95	88
April 17	do	74.0	133.0	3.12	1.59	415
May 15	do	76.0	146.0	3.68	1.74	538
June 5	H. B. R. Thompson	70.8	114.0	2.17	1.29	247
July 11	H. C. Ritchie	79.0	167.0	3.88	2.13	649
July 24	do	77.0	151.0	3.27	2.13	494
Aug. 7	do	75.0	148.0	2.46	1.75	364
Aug. 28	do	79.0	86.5	3.95	1.93	342
Sept. 18	do	78.5	86.5	3.83	1.88	331
Oct. 2	G. R. Elliott	77.5	89.2	3.40	1 86	303
Oct. 16	do	76.0	79.2	3.07	1.73	244
Oct. 30	H. C. Ritchie	77.0	69.2	3.00	1.65	208
Nov. 13	do	76.5	72.0	2.62	1.56	189
Nov. 27	do	77.0	72.8	3.07	1.59	224
Dec. 10	do	59.0	63.0	3.11	1.50	196

Daily Gauge Height and Discharge of Ghost River at Gillies' Ranche, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Guage Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.75	b 176	1.60	143	1.10	117	1.10	88	0.68	101	1.24	260
2	1.80	176	1.58	143	1.10	120	1.12	88	0.64	96	1.22	252
3	1.85	175	1.40	138	1.30	124	1.10	88	0.79	118	1.03	179
4	1.85	170	1.30	132	1.50	124	1.08	89	0.74	110	0.91	143
5	1.85	165	1.22	126	1.30	125	1.15	90	0.71	106	1.03	179
6	1.90	160	1.42	137	1.18	125	3.40	150	0.69	103	0.93	148
7	2.60	161	1.50	139	1.35	126	2.79	160	0.69	103	1.33	297
8	2.60	162	1.45	139	1.32	126	2.76	170	a 0.70	104	1.55	387
9	2.59	155	1.60	139	1.30	125	2.23	180	0.71	106	1.39	322
10	2.59	150	2.10	140	1.34	123	3.54	250	0.74	110	1.19	240
11	2.80	144	1.60	140	1.45	122	3.50	250	1.69	445	1.16	228
12	3.02	143	1.69	141	1.38	120	3.50	250	1.99	568	1.13	216
13	2.00	142	1.69	141	1.30	117	3.50	b 300	1.98	564	1.13	216
14	2.30	141	1.59	142	1.28	119	a 2.00	572	2.18	645	1.03	179
15	2.32	142	1.60	142	1.28	119	a 1.80	490	1.75	469	0.99	165
16	2.34	141	1.50	140	1.20	114	a 1.70	449	1.74	465	0.93	148
17	2.55	139	1.45	138	1.22	112	1.59	404	1.59	404	0.92	146
18	2.55	137	1.42	136	1.20	112	1.39	322	1.39	322	0.97	159
19	a 2.70	135	1.00	127	1.20	97	1.29	281	1.31	289	1.68	441
20	2.98	132	1.40	129	1.12	91	1.27	273	1.44	342	1.58	400
21	2.95	134	1.38	129	1.10	92	1.19	240	1.59	404	1.49	363
22	2.85	134	0.98	122	1.15	94	1.14	220	1.75	469	1.23	256
23	2.36	134	1.12	122	1.10	93	0.99	165	1.84	506	1.19	240
24	2.40	136	1.12	123	1.10	93	0.84	128	1.79	486	1.43	338
25	2.28	137	1.10	118	1.10	92	0.79	118	1.41	330	1.78	482
26	1.90	139	1.00	112	1.10	91	0.74	110	1.51	371	a 2.50	777
27	1.69	140	1.40	112	1.20	90	0.74	110	1.29	281	a 3.30	1,225
28	1.55	142	1.00	113	1.20	90	0.74	110	1.54	383	a 3.00	982
29	1.60	144	.....	.....	1.23	89	0.71	106	1.51	371	a 3.00	982
30	1.62	146	.....	.....	1.15	89	0.69	103	1.39	322	a 2.50	777
31	1.70	147	.....	.....	1.10	88	.....	.....	1.33	297	.....	.....

a Gauge height interpolated.
b Ice conditions Jan. 1 to April 13.

Daily Gauge Height and Discharge of Ghost River at Gillies' Ranche, for 1913. *Concluded.*

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec. .ft*	*Feet.*	*Sec.-ft.*
1	a 2.50	777	1.87	400	2.13	426	1.86	316	1.65	231	1.63	223
2	a 2.30	695	1.87	400	2.09	410	1.86	316	1.67	239	1.65	231
3	a 2.20	654	1.85	391	2.07	402	1.85	311	1.67	239	1.53	192
4	a 2.20	654	1.83	383	2.05	393	1.85	311	1.69	246	1.53	192
5	a 2.30	695	1.83	383	2.28	488	1.85	311	1.72	258	1.53	192
6	a 2.20	654	1.83	383	2.09	410	1.84	307	1.69	246	1.55	198
7	a 2.20	654	1.83	383	2.05	393	1.86	316	1.69	246	1.58	206
8	a 2.20	654	1.85	388	2.01	377	1.85	311	1.69	246	1.68	242
9	a 2.10	613	2.38	600	2.01	377	1.83	303	1.68	242	1.63	223
10	a 2.20	654	2.35	588	1.99	369	1.83	303	1.68	242	1.50	184
11	a 2.13	649	2.18	510	1.98	365	1.83	303	1.67	239	1.49	182
12	2.08	600	2.17	510	1.96	357	1.83	303	1.65	231	1.48	179
13	2.14	615	2.27	540	1.96	357	1.85	311	1.55	198	1.49	182
14	2.15	610	2.17	495	1.92	340	1.85	311	1.53	192	1.50	184
15	2.08	575	2.14	480	1.88	324	1.82	299	1.55	198	1.50	184
16	1.97	518	2.08	452	1.88	324	1.78	283	1.69	246	1.48	179
17	1.90	480	2.15	480	1.88	324	1.73	262	1.67	239	1.48	179
18	1.90	470	2.13	464	1.89	328	1.78	283	1.62	220	1.50	184
19	1.88	456	2.09	445	1.87	320	1.78	283	1.63	223	1.55	198
20	1.87	438	2.05	425	1.87	320	1.78	283	1.58	206	1.50	184
21	1.98	476	2.04	420	1.87	320	1.78	283	1.53	192	1.68	182
22	2.13	526	2.03	410	1.89	328	1.77	279	1.62	220	1.60	180
23	2.09	500	1.99	390	1.88	324	1.78	283	1.68	242	1.69	178
24	2.13	506	1.98	380	1.87	320	1.73	262	1.79	287	1.62	177
25	2.11	498	1.97	375	1.86	316	1.79	287	1.69	246	a 1.65	176
26	1.99	449	1.97	370	1.86	316	1.76	275	1.59	209	1.67	175
27	1.99	449	1.96	364	1.86	316	1.77	279	1.59	209	1.63	174
28	1.89	408	1.93	344	1.85	311	1.73	262	1.58	206	1.62	173
29	1.93	424	1.93	344	1.85	311	1.72	258	1.67	239	1.65	172
30	1.88	404	1.99	369	1.86	316	1.67	239	1.65	231	1.72	171
31	1.87	400	2.03	385	.....	.....	1.65	231	.....	.....	1.98	170

a Gauge height interpolated.
b Ice conditions Dec. 21 to 31.

Monthly Discharge of Ghost River at Gillies' Ranche, for 1913.

(Drainage area 360 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	176	132	148	0.411	0.47	9,100
February	143	112	132	0.367	0.38	7,331
March	126	88	108	0.300	0.35	6,641
April	572	88	212	0.589	0.66	12,615
May	645	96	316	0.879	1.01	19,430
June	1,225	143	371	1.03	1.15	22,076
July	777	400	553	1.54	1.78	34,003
August	600	344	428	1.19	1.37	26,317
September	488	311	353	0.98	1.09	21,005
October	316	231	289	0.803	0.93	17,770
November	287	192	230	0.639	0.71	13,686
December	242	170	189	0.525	0.60	11,621
The year	.....	.....	.....	.....	10.50	201,595

JUMPINGPOUND CREEK NEAR JUMPING POUND.

This station was established May 7, 1908, by P. M Sauder. It is located at a traffic bridge on a road diversion on the S.E. ¼ Sec. 30, Tp. 24, Rge. 4, West 5th Mer., and is about 300 yards from Jumping Pound P. O.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to the downstream face of the first pile bent west of the main truss of the bridge. The zero (elev. 89.84 is referred to a permanent iron bench mark (assumed elev. 100.00) situated 30 feet northeast of the east end of the bridge.

The channel is straight for 600 feet above and 500 feet below the station. The current is sluggish at and above the station, but breaks into rapids about 150 feet below the station. The right bank is composed of gravel and boulders, mixed with clay, and is not liable to overflow. The left bank is similar, but not so high, and is liable to overflow in excessive floods. The bed of the stream is composed of coarse gravel and boulders. It is rough and may shift in flood stages. The stream is divided into several channels during its higher stages by a pier and pile bents supporting the bridge.

At low water stages of the stream discharge measurements are made at wading sections, either above or below the bridge. During higher stages of the stream, discharge measurements are made from the down stream side of the bridge. The initial point for soundings is the west side of the right abutment. Distances are marked on the railing of the bridge, at very five feet from the initial point.

During 1913, the gauge was read by John Bateman, the postmaster at Jumping Pound.

DISCHARGE MEASUREMENTS of Jumpingpound Creek near Jumping Pound, for 1913

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 17	H. C. Ritchie	106.0	221.0	1.17	2.74	257
June 6	H. B. R. Thompson	96.5	194.0	0.61	2.40	119
July 10	H. C. Ritchie	97.0	192.0	0.74	2.38	143
July 25	do	97.5	174.0	0.46	2.25	81
Aug. 8	do	89.0	162.0	0.30	2.06	49
Sept. 19	do	*a*31.0	36.4	1.08	2.14	39
Oct. 3	G. R. Elliott	*a*42.0	32.8	0.85	2.08	28
Oct. 17	do	*a*43.5	41.8	0.66	2.09	28
Oct. 31	H. C. Ritchie	*a*31.0	34.3	1.07	2.01	37

a Width, Area, etc., refers to wading section 400 ft. downstream.

DAILY GAUGE HEIGHT AND DISCHARGE of Jumpingpound Creek, near Jumping Pound, for 1913.

DAY.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*	*Feet.*	*Sec.-ft.*
1	.....	.....	2.05	22	2.51	160	2.60	196
2	.....	.....	2.09	28	2.49	152	2.55	176
3	.....	.....	2.06	24	2.45	137	2.60	196
4	.....	.....	2.04	20	2.42	126	2.70	240
5	.....	.....	2.09	28	2.40	119	2.60	196
6	4.05	.....a	2.15	42	2.35	102	2.59	192
7	4.06	.....	2.20	55	2.31	88	2.55	176
8	4.10	.....	2.21	58	2.36	105	2.49	152
9	3.75	.....	2.20	55	2.55	176	2.43	130
10	3.65	.....	2.30	85	2.55	176	2.55	176
11	3.40	.....	2.30	85	2.60	196	2.50	156
12	3.55	.....	2.85	315	2.55	176	2.49	152
13	3.15	.....	3.05	441	2.50	156	2.43	130
14	2.75	.....a	3.00	405	2.48	149	2.45	137
15	2.60	196	2.85	315	2.45	137	2.41	123
16	2.35	102	2.70	240	2.40	119	2.38	112
17	2.55	176	2.63	209	2.30	85	2.34	99
18	2.50	156	2.60	196	2.25	70	2.29	82
19	2.49	152	2.50	156	2.25	70	2.25	70
20	2.35	102	2.32	92	2.75	264	2.23	64
21	2.30	85	2.45	137	2.65	218	2.20	55
22	2.28	79	2.40	119	2.50	156	2.19	53
23	2.25	70	2.40	119	2.35	102	2.21	58
24	2.25	70	2.39	116	2.60	196	2.21	58
25	2.20	55	2.39	116	2.80	288	2.28	79
26	2.15	42	2.36	105	3.25	613	2.27	76
27	2.14	40	2.55	176	3.40	778	2.25	70
28	2.11	32	2.55	176	3.25	613	2.26	73
29	2.11	32	2.55	176	3.09	471	2.26	73
30	2.05	22	2.54	172	3.05	441	2.23	64
31	.....	.....	2.53	168	.....	.....	2.23	64

a Ice conditions to April 14 not sufficient data to compute discharge.

DAILY GAUGE HEIGHT AND DISCHARGE of Jumpingpound Creek, near Jumping Pound, for 1913.—*Concluded.*

DAY.	August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.22	61	2.45	137	2.10	30
2	2.21	58	2.35	102	2.10	30
3	2.20	55	2.35	102	2.09	28
4	2.19	53	2.34	99	2.08	27
5	2.17	48	2.34	99	2.08	27
6	2.15	42	2.33	95	2.08	27
7	2.17	48	2.32	92	2.07	25
8	2.55	176	2.30	85	2.07	25
9	2.59	192	2.20	55	2.07	25
10	2.60	196	2.15	42	2.06	24
11	2.65	218	2.05	22	2.06	24
12	2.71	245	2.05	22	2.06	24
13	2.80	288	2.04	20	2.07	25
14	2.95	374	2.05	22	2.07	25
15	2.60	196	2.04	20	2.07	25
16	2.51	176	2.04	20	2.09	27
17	2 55	176	2.04	20	2.08	25
18	2.53	168	2.05	22	2.07	25
19	2.51	160	2.15	42	2.06	24
20	2.49	152	2.14	40	2.06	24
21	2.43	130	2.19	53	2.06	24
22	2.40	119	2.10	30	2.07	25
23	2.36	105	2.25	70	2.07	25
24	2.33	95	2.20	55	2.07	25
25	2.30	85	2.15	42	2.06	25
26	2.28	79	2.15	42	2.06	27
27	2.30	85	2.10	30	2.05	27
28	2.25	70	2.10	30	2.04	27
29	2.25	70	2.08	27	2.03	28
30	2.24	67	2.05	22	2.04	30
31	2.50	156	.....	.....	2.01	37

MONTHLY DISCHARGE of Jumpingpound Creek near Jumping Pound, for 1913.

(Drainage area 181 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (15 to 30)	196	22	88	0.486	0.29	2,792
May	441	20	144	0.796	0.92	8,854
June	778	70	221	1.22	1.36	13,150
July	240	53	119	0.657	0.76	7,317
August	374	42	134	0.740	0.85	8,239
September	137	20	52	0.287	0.32	3,094
October	32	24	26	0.144	0.17	1,599
The period					4.67	45,045

BOW RIVER AT CALGARY

This station was established on November 25, 1910, by H. R. Carscallen. It is located at the Langevin traffic bridge, on Fourth Street East, in the N.E. ¼ Sec. 15, Tp. 24, Rge. 1, W. 5th Mer., two miles above the original station at the Cushing bridge, established May 5, 1908 by P. M. Sauder. As the cross-section at the Langevin bridge was affected by some old bridge piers, a plain staff gauge was at first fixed to a breakwater several hundred feet upstream from the bridge but on November 14, 1911, a chain gauge was established on the Langevin bridge and the observations have been made with it since that date.

This gauge, which is of the standard chain type, is fixed to the floor of the bridge at a point about the centre of the downstream side of the north span. The length of the chain from the bottom of the weight to the marker is 22.28 feet. The zero of the gauge (elevation 82.59) is referred to a permanent iron bench mark (assumed elevation 100.00) situated at the intersection of Second and Third Avenues and about 60 feet west of First Street East. There is a gauge embedded in the cement on the north side of the centre pier, (whose zero is 87.20 above the same assumed datum), which is usually used to check the chain gauge.

The river flows in one channel at all stages. It is almost straight for about half a mile above and a quarter of a mile below the station. Both banks are low but are not liable to overflow. The bed of the stream is composed of coarse gravel and may shift in flood stages of the stream.

Discharge measurements are made from the downstream side of the bridge, which is a two span steel structure supported by concrete abutments and a pier. The initial point for soundings is the south face of the left abutment.

During 1913 the gauge was read by C. A. Lang.

DISCHARGE MEASUREMENTS of Bow River at Calgary, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 9	F. R. Burfield	259.5	744	1.41	5.10	1,052
Jan. 25-27	do	451.0	662	1.91	6.80	1,267
Feb. 6	V. Meek	262.0	893	1.02	6.02	908
Feb. 21	H. C. Ritchie	252.0	728	1.50	6.00	1,192
Mar. 7	do	283.0	861	1.78	5.97	1,539
Mar. 20	V. Meek	270.0	456	1.90	4.98	864
April 4	H. C. Ritchie	274.0	829	1.46	5.30	1,210
April 23	do	288.0	946	2.21	4.19	2,095
May 21	do	292.0	983	2.35	4.26	2,313
June 10	H. B. R. Thompson	325.0	2,008	5.33	7.53	10,711
July 12	P. H. Daniells	321.8	1,734	4.61	6.21	7,991
July 24	do	310.0	1,653	5.09	6.28	8,407
Aug. 4	do	307.0	1,549	3.89	5.91	6,022
Aug. 16	do	318.0	1,778	4.53	6.30	8,069
Aug. 29	do	304.0	1,401	3.64	5.52	5,108
Sept. 10	do	300.0	1,405	3.98	5.60	5,582
Sept. 20	do	296.0	1,307	3.37	5.21	4,416
Sept. 29	do	283.0	1,148	2.78	4.75	3,182
Oct. 23	F. R. Steinberger	289.0	1,012	2.32	4.32	2,354
Nov. 5	G. H. Whyte	295.0	1,059	1.91	4.09	2,017
Dec. 18	J. S. Tempest	308.0	821	2 15	4.04	1,703

Daily Gauge Height and Discharge of Bow River at Calgary, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height	Discharge.
	Feet	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	b 4 55	1,003	5 56	1,060	a 5 72	1,295	5 18	1,180	3 93	1,658	6 69	9,830
2	4.46	1,015	5 53	1,020	5 94	1,370	5 23	1,214	3 93	1,658	6 81	10,310
3	4 42	1,025	5 48	1,000	6 15	1,380	5 18	1,224	3 92	1,642	7 05	11,270
4	4.67	1,035	5 40	960	6 25	1,410	5 23	1,210	3 96	1,706	6 99	11,030
5	4 86	1,045	5 80	910	6 25	1,440	5 33	1,195	3 96	1,706	7 11	11,510
6	4.88	1,055	5 58	908	6 30	1,420	5 36	1,180	3 94	1,674	7 19	11,830
7	4 92	1,065	6 05	1,020	6 22	1,539	5 50	1,200	3 92	1,642	7 11	11,510
8	4 96	1,070	6 07	1,060	5 88	1,495	5 53	1,185	3 87	1,565	7 34	12,430
9	5.12	1,052	6 10	1,100	5 78	1,460	5 38	1,260	3 91	1,626	7 49	13,030
10	5 16	1,064	6 15	1,115	5 58	1,435	5 47	1,350	4 02	1,804	7 70	13,870
11	4.99	1,041	6 30	1,180	5 64	1,415	5 63	1,440	4 36	2,427	7 86	14,510
12	5 11	1,020	6 36	1,210	5 43	1,430	5 56	1,530	4 64	2,994	7 90	14,670
13	5.25	1,060	6 47	1,250	5 48	1,310	a 5 36	1,620	5 12	4,082	7 80	14,270
14	5.36	1,105	6 45	1,245	5 50	1,210	5 16	1,720	5 06	3,932	7 76	14,110
15	5.67	1,140	6 39	1,242	5 50	1,220	5 20	1,810	4 61	2,931	7 35	12,470
16	5.89	1,120	6 31	1,236	5 52	1,165	4.70	1,900	4 53	2,766	7 19	11,830
17	6 12	1,112	6 20	1,228	5 54	1,100	4 61	1,990	4 35	2,408	6 95	10,870
18	6.16	1,110	6 14	1,220	5 22	1,020	4 54	2,080	4 23	2,177	6 66	9,710
19	6.23	1,090	6 11	1,210	4 72	1,020	4 96	2,170	4 31	2,330	6 37	8,550
20	6.35	1,070	6 05	1,200	4 98	864	c 4 30	2,310	4 23	2,177	6 35	8,470
21	6.50	1,180	6 00	1,192	5 12	910	4 34	2,388	4 25	2,215	7 00	11,070
22	6.68	1,230	5 93	1,150	5 25	903	4 29	2,291	4 38	2,466	6 95	10,870
23	6.72	1,190	5 84	1,130	5 05	884	4 19	2,102	4 46	2,625	6 68	9,790
24	6.65	1,235	5 71	1,110	5 08	910	4 09	1,923	4 84	3,423	6 60	9,470
25	7.02	1,267	5 62	1,130	5 02	880	4 00	1,770	4 95	3,670	6 84	10,430
26	6.93	1,260	5 50	1,080	a 5 10	930	4.00	1,770	5 18	4,238	7 08	11,390
27	6.81	1,270	5.50	1,120	a 5.18	1,030	4 00	1,770	5 50	5,190	7 32	12,350
28	6.73	1,210	5.50	1,200	a 5 25	1,090	4 02	1,804	5 71	5,928	7 35	12,470
29	6.62	1,185			5 32	1,150	3 96	1,706	6 03	7,190	a 7 17	11,750
30	6.51	1,170			5 34	1,140	3.90	1,610	6 31	8,310	6 99	11,030
31	6.23	1,165			5 15	1,126			6 50	9,070		

a Gauge height interpolated.
b to c. Ice conditions.

Daily Gauge Height and Discharge of Bow River at Calgary, for 1913.—*Concluded.*

Day.	July.		August .		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	6.96	10,910	5.84	6,430	5.63	5,638	4.75	3,228	4.00	1,770	4.13	1,994
2	6.90	10,670	5.79	6,232	5.59	5,496	4.70	3,120	4.06	1,872	4.00	1,770
3	6.88	10,590	5.75	6,080	5.45	5,030	4.69	3,099	4.18	2,084	3.78	1,432
4	6.62	9,550	6.10	7,470	5.30	4,570	4.75	3,228	4.23	2,177	3.33	890
5	6.43	8,790	5.98	6,990	5.51	5,224	4.76	3,249	4.20	2,120	3.85	1,535
6	6.22	7,950	5.93	6,790	6.24	8,030	4.75	3,228	4.14	2,012	3.93	1,658
7	6.16	7,710	5.83	6,390	6.10	7,470	4.62	2,952	4.11	1,958	3.99	1,754
8	6.30	8,270	5.90	6,670	6.05	7,270	4.61	2,931	4.21	2,139	4.13	1,994
9	6.41	8,710	6.10	7,470	5 70	5,890	4 52	2,746	4.12	1,976	4.21	2,139
10	6.22	7,950	a 6.31	8,310	5.65	5,710	4.44	2,585	4.18	2,084	4.04	1,838
11	6.18	7,790	6.51	9,110	5.65	5,710	4.54	2,787	4.13	1,994	4.13	1,994
12	6.24	8,030	6.34	8,430	5.50	5,190	4.41	2,525	4.05	1,855	4.20	2,120
13	6.15	7,670	6.37	8,550	5.40	4,870	4.54	2,787	4.12	1,976	4.26	2,234
14	6.06	7,310	6.55	9,270	5.26	4,458	4.49	2,685	4.04	1,838	4.26	2,234
15	5.94	6,830	6.50	9,070	5.33	4,660	4.50	2,705	4.09	1,923	4.20	2,120
16	5.75	6,080	6.31	8,310	5.28	4,514	4.51	2,726	4.03	1,821	4.13	1,994
17	5.59	5,496	6.10	7,470	5.18	4,238	4.53	2,766	4.14	2,012	4.11	1,958
18	5.51	5,224	6.06	7,310	5.11	4,056	4.50	2,705	4.14	2,012	d 4.04	1,703
19	5.43	4,966	6.00	7,070	5.12	4,082	4.39	2,486	4.12	1,976	4.01	1,690
20	5.40	4,870	5.94	6,830	5.20	4,290	4.44	2,585	4.11	1,958	3.91	1,680
21	5.63	5,638	5.84	6,430	5.08	3,981	4.35	2,408	3.98	1,738	3.93	1,655
22	5.95	6,870	5.71	5,928	5.09	4,005	4.39	2,486	3.66	1,268	3.91	1,657
23	6.15	7,670	5.62	5,602	5.04	3,907	4.23	2,177	3.87	1,565	4.00	1,625
24	6.32	8,350	5.50	5,190	4.97	3,716	4.25	2,215	4.00	1,770	3.88	1,658
25	6.26	8,110	5.62	5,602	4.93	3,624	4.35	2,408	4.40	2,505	3.78	1,678
26	6.21	7,910	5.60	5,530	4.87	3,489	4.23	2,177	4.36	2,427	3.74	1,740
27	6.20	7,870	5.61	5,566	4.76	3,249	4.20	2,120	4.16	2,048	4.31	1,765
28	6.15	7,670	5.61	5,566	4.72	3,163	4.25	2,215	4.13	1,994	4.39	1,800
29	6.13	7,590	5.57	5,428	4.77	3,270	4.20	2,120	4.02	1,804	4.61	1,760
30	6.07	7,350	5.55	5,360	4.75	3,228	4.20	2,120	4.04	1,838	4.31	1,755
31	5.93	6,790	5.48	5,126	.....	.....	4.20	2,120	.....	.....	e 4.81	1,775

a Gauge height interpolated.
d to e Ice conditions.

Monthly Discharge of Bow River at Calgary, for 1913.

(Drainage area 3056 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	1,270	1,003	1,118	0.366	0.42	68,744
February	1,250	908	1,124	0.368	0.38	62,424
March	1,539	864	1,192	0.390	0.45	73,294
April	2,380	1,180	1,663	0.544	0.61	98,955
May	9,070	1,565	3,201	1.05	1.21	196,822
June	14,670	8,470	11,557	3.78	4 22	687,684
July	10,910	4,870	7,651	2.50	2.88	470,442
August	9,270	5,126	6,825	2.23	2.57	419,655
September	8,030	3,163	4,561	1.49	1.66	271,399
October	3,249	2,120	2,635	0.862	0.99	162,020
November	2,505	1,268	1,951	0.638	0.71	116,090
December	2,234	890	1,794	0.587	0.68	110,308
The year	.....	.....	.....	.....	16.78	2,737,837

ELBOW RIVER AT CALGARY.

This station was established May 8, 1908, by P. M. Sauder. It is located at the traffic bridge between Eleventh and Twelfth Avenues East, in the S.W. ¼ Sec. 18, Tp. 24, Rge. 1, W. 5th Mer.

The gauge, which is of the standard chain type, is fixed to the side-walk on the upstream side of the bridge. The zero (elev. 84.75) is referred to a bench mark (assumed elev. 100.00) on the extreme upstream corner of the cement wing wall of the left abutment of the bridge. The length of the chain from the bottom of the weight to the marker is 16.03 feet.

The stream is confined to one channel. Both banks are high and do not overflow. The bed of the stream is composed of boulders and gravel and is not liable to change at the station, but may do so farther up the stream where there is a small ripple. The channel is straight for about 500 feet below and 50 feet above the station. The current is swift at all stages of the stream. This station is so close to the mouth of the river that there will be backwater at the gauge when the Bow River is in flood.

Discharge measurements are made by means of a cable-car, tagged wire, and stay wire. The initial point for soundings is the zero of the tagged wire, at its fastening to the cable support, on the left bank.

During 1913, the gauge was read by Mrs. I. S. White.

There are no tributaries below this station and there is no water diverted from the river except that used by the City of Calgary, whose intake is about eleven miles west of Calgary.

DISCHARGE MEASUREMENTS of Elbow River at Calgary, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 20	F. R. Burfield	117	152.8	0.64	1.72	98
Jan. 28	do	115	173.4	0.72	1.80	126
Feb. 5	V. Meek	121	189.0	0.66	1.79	124
Feb. 22	H. C. Ritchie	95	181.0	0.71	1.81	128
Mar. 8	do	110	204.0	0.69	1.91	141
April 5	do	120	224.0	0.70	1.93	158
April 23	do	131	288.0	1.04	2.17	298
May 22	do	137	345.0	1.51	2.46	521
June 11	H. B. R. Thompson	140	420.0	2.17	3.24	910
July 11	P. H. Daniells	136	346.4	1.42	2.57	491
July 23	do	137	353.1	1.46	2.65	517
Aug. 6	do	132	312.0	1.17	2.40	365
Aug. 15	do	140	420.0	2.00	3.07	839
Aug. 28	do	139	305.0	1.20	2.37	366
Sept. 11	do	132	318.0	1.12	2.34	378
Sept. 20	do	128	271.0	1.03	2.09	280
Sept. 29	do	127	259.0	0.91	2.08	236
Oct. 22	F. R. Steinberger	129	254.0	0.98	2.01	241
Nov. 14	do	124	252.0	1.01	2.04	255
Nov. 22	do	129	254.0	0.98	2.01	241
Dec. 9	J. S. Tempest	125	237.0	0.70	1.88	167
Dec. 12	do	125	225.0	0.72	1.88	164
Dec. 19	do	123	212.0	0.55	1.87	118
Dec. 23	do	68	52.0	1.44	1.63	76

Daily Gauge Height and Discharge of Elbow River at Calgary, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.58	80	1 75	125	1.76	116	1.89	136	1.97	178	2.86	742
2	1.59	78	1 78	129	1.79	120	1.90	141	2.00	194	2.84	712
3	1.63	76	1 82	120	1.81	123	1.89	136	2.00	194	2.84	700
4	1.65	74	1 77	118	1.80	124	1.92	151	2.01	200	2.71	578
5	1.69	72	1.75	124	1.80	124	1.94	162	1.96	172	2.84	676
6	1 62	69	1.71	127	1.84	128	1.95	167	1.98	183	2.80	630
7	1.61	67	1.64	130	1.87	134	2.06	228	2.05	222	2.81	624
8	1 59	80	1.68	122	1.91	146	2 23	340	2.08	240	2.71	530
9	1 58	89	1.67	126	1.98	183	2.16	291	2.04	216	2.67	485
10	1.57	82	1.67	132	1.91	146	2.23	340	2.10	252	2.85	625
11	1.80	78	1.68	124	1.92	151	2.46	524	2.66	692	3.20	905
12	1.79	74	1.65	130	1.97	178	2 64	676	2.67	701	3.19	898
13	1 76	74	1.68	136	1.86	121	2.87	869	3.16	1,112	3.12	849
14	1 77	83	1 67	138	1.84	111	3 04	1,012	3.08	1,045	3 00	765
15	1.81	83	1.68	134	1 85	116	3.27	1,205	2.94	928	2.79	618
16	1.86	79	1.71	131	1.84	111	2.75	768	2.71	734	2.75	591
17	1.78	82	1.76	127	1.84	111	2.58	625	2.83	835	2.60	495
18	1.77	81	1.77	124	1.82	102	2.49	550	2.67	701	2.54	461
19	1.83	80	1.78	129	1.74	66	2 45	516	2.46	524	2.53	455
20	1.70	98	1.78	131	1.74	66	2.51	566	2.38	457	2.71	565
21	1.68	97	1.77	130	1.74	66	2.43	499	2.35	432	2.80	625
22	1.87	110	1.80	128	1.75	70	2 32	408	2.45	516	2.68	545
23	1.76	103	1 84	126	1.73	62	2.17	298	2.44	494	2.59	489
24	1.69	112	1.79	120	1.76	74	2.20	318	2.45	492	2.55	466
25	1.77	124	1.79	116	1.74	66	2.06	228	2.50	524	2 70	558
26	1.88	120	1.76	118	1.74	66	2.03	211	2.55	552	3.32	989
27	1.86	129	1.74	116	1.75	70	2.01	200	2.73	695	3.46	1,087
28	1.85	126	1.76	114	1.78	83	2.04	216	2.80	742	3.58	1,171
29	1.74	122	.....	.....	1.77	79	2.03	211	2.96	865	3 40	1,045
30	1.79	126	.....	.....	1.81	97	1.98	183	2.98	872	3.31	982
31	1.74	122	.....	.....	1.84	111	.....	.....	2.80	704	.....	.....

Daily Gauge Height and Discharge of Elbow River, at Calgary, for 1913.—*Concluded.*

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.28	961	2 43	405	2 29	344	2 03	252	1 99	239	1 91	200
2	3.18	891	2.38	382	2.40	391	2 05	258	1.98	236	1 92	200
3	3.09	828	2 30	348	2.36	373	2 03	252	1 98	236	1 90	194
4	2 84	653	2 41	396	2 29	344	2 05	258	1 98	236	1 86	188
5	2 76	598	2 48	429	2.44	409	2.02	248	1 98	236	1 85	182
6	2 63	514	2.46	419	2.54	461	2.02	248	1 98	236	1 85	182
7	2 55	466	2.38	382	2.47	424	2.01	245	1.98	236	1 85	183
8	2 51	444	2 36	373	2.40	391	2 01	245	1.97	234	1 85	178
9	2 57	478	2 43	405	2.42	400	2.01	245	1.97	234	1 81	167
10	2 54	461	3 86	1,367	2.42	400	2.02	248	1.97	234	1.87	172
11	2 53	455	3 37	1,024	2 32	356	2.01	245	1.97	234	1.89	168
12	2 52	450	3.31	982	2.22	317	2.00	242	1 97	234	1.92	164
13	2 63	514	3.19	898	2.14	288	1.99	239	1.97	234	1 87	158
14	2 54	461	3 16	877	2.16	295	2.08	268	2.08	268	1.98	163
15	2 47	424	3 10	835	2 23	320	2.06	261	1.98	236	1.86	170
16	2 44	409	2 81	632	2.20	309	2.05	258	1 91	218	1.82	164
17	2 39	387	2 76	598	2.19	305	2.00	242	1.90	215	1.81	156
18	2 35	369	2 89	688	2.17	298	1.98	236	2.00	242	1.81	138
19	2 31	352	2 76	598	2.18	302	1 98	236	2.02	248	1 88	118
20	2 24	324	2 73	578	2.13	284	2.07	264	1.92	220	1 68	118
21	2.22	317	2.69	552	2.08	268	2.05	258	1 89	213	1 69	109
22	2.41	396	2 60	495	2.10	274	2 02	248	1.99	239	1.63	88
23	2 52	450	2 47	424	2 10	274	2 00	242	1 90	225	1.63	76
24	2 51	444	2 54	461	2.08	268	2 00	242	1.97	234	1 63	76
25	2 46	419	2 51	444	2.04	255	2 00	242	1 98	233	1.60	74
26	2 42	400	2 46	419	2 03	252	1.99	239	1 92	221	1.53	69
27	2 40	391	2 44	409	2.03	252	2 02	248	1.95	218	1.54	70
28	2 38	382	2 43	405	2.01	245	2.01	245	1.92	214	1.57	74
29	2 35	369	2 35	369	2.01	245	1.99	239	1.90	206	1.70	84
30	2 35	369	2.33	361	2.02	248	1.99	239	1.89	198	1 80	100
31	2.40	391	2.33	361	.....	.....	1.99	239	.....	.....	1.77	95

Monthly Discharge of Elbow River at Calgary, for 1913.

(Drainage area 482 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	129	67	92.6	0.192	0 22	5,694
February	138	114	126.0	0.261	0 27	6,998
March	183	62	107.0	0.222	0 26	6,579
April	1,205	136	406.0	0.842	0 94	24,159
May	1,112	172	538.0	1.120	1 29	33,080
June	1,171	455	695.0	1 444	1 61	41,355
July	961	317	476.0	0.988	1.14	29,268
August	1,367	348	559 0	1.160	1 34	34,372
September	461	245	320 0	0 664	0 74	19,041
October	268	236	247.0	0 512	0 59	15,187
November	268	198	230.0	0.477	0 53	13,686
December	200	69	138.0	0.286	0 33	8,485
The year					9 26	237,904

NOSE CREEK NEAR CALGARY.

This station was established April 24, 1911, by H. C. Ritchie. It is located at the traffic bridge on the N.W. ¼ Sec. 13, Tp. 24, Rge. 1, W. 5th Mer. The station is about one and one-half miles east of the centre of the city and about one quarter mile above the junction of Nose Creek with Bow River.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to the upstream face of the upper pile of a row near the left bank. The zero (elev. 92.81) is referred to a permanent iron bench mark (assumed elev. 100.00) on the left bank near the end of the bridge.

The channel is straight for about 50 feet above and 150 feet below the station. A small island just below the bridge divides the stream into two channels in low water and causes cross-currents at the bridge. Both banks are high, steep, gravelly and clear of brush. The bed of the stream is composed of coarse gravel.

Discharge measurements are made from the downstream side of the bridge at high stages and at a wading section downstream in low water.

During 1913, the gauge was read by C. A. Lang.

DISCHARGE MEASUREMENTS of Nose Creek near Calgary, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24	H. C. Ritchie	23.0	18.6	1.30	1.90	24.0
May 22	do	25.0	24.4	1.77	2.01	43.0
July 16	P. H. Daniells	22.0	17.5	1.58	1.94	28.0
July 25	do	22.2	19.4	0.84	1.88	16.2
Aug. 5	do	18.5	17.0	0.75	1.82	12.6
Aug. 16	do	28.0	28.8	1.51	1.96	43.0
Aug. 27	do	23.0	19.4	0.84	1.85	16.2
Sept. 9	do	22.0	16.0	0.99	1.82	15.6
Sept. 19	do	20.3	16.1	0.74	1.78	12.0
Oct. 24	F. R. Steinberger	26.0	16.0	0.91	1.80	14.5

DAILY GAUGE HEIGHT AND DISCHARGE of Nose Creek, near Calgary, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.86	17.2	1.85	16.2
2	.....	.....	1.85	16.2	1.85	16.2
3	.....	.....	1.88	19.3	1.85	16.2
4	.....	.....	1.86	17.2	1.84	15.6
5	.....	.....	1.86	17.2	1.87	18.3
6	.....	.....	1.84	15.6	1.90	21.0
7	.....	.....	1.85	16.2	1.88	19.3
8	.....	.....	1.89	20.0	1.86	17.2
9	.....	.....	1.90	21.0	1.87	18.3
10	2.55	177.0	1.96	32.0	1.87	18.3
11	2.63	197.0	2.16	80.0	2.04	50.0
12	2.75	227.0	2.45	152.0	2.11	68.0
13	2.70*a*	214.0	2.55	177.0	2.03	48.0
14	2.65	202.0	2.54	174.0	1.94	28.0
15	2.26	105.0	2.35	127.0	1.91	23.0
16	2.24	100.0	2.35	127.0	1.87	18.3
17	2.14	75.0	2.37	132.0	1.81	13.6
18	2.17	83.0	2.27*a*	108.0	1.77	11.6
19	2.12	70.0	2.18	85.0	1.79	12.5
20	2.04	50.0	2.13	73.0	2.03	48.0
21	1.98	36.0	2.04	50.0	2.06	56.0
22	1.98	36.0	2.01	43.0	2.06	56.0
23	1.90	21.0	1.97	34.0	1.96	32.0
24	1.87	18.3	1.96	32.0	1.93	26.0
25	1.84	15.6	1.96	32.0	1.96	32.0
26	1.86	17.2	1.94	28.0	2.06	56.0
27	1.85	16.2	1.91	23.0	2.24	100.0
28	1.84	15.6	1.87	18.3	2.51	167.0
29	1.86	17.2	1.91	23.0	2.47*a*	157.0
30	1.86	17.2	1.87	18.3	2.43	147.0
31	.....	.....	1.85	16.2	.....	.....

a Gauge height interpolated.

DAILY GAUGE HEIGHT AND DISCHARGE of Nose Creek, near Calgary, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.38	135.0	1.83	14.9	1.94	28.0	1.74	10.4
2	2.31	118.0	1.81	13.6	1.94	28.0	1.74	10.4
3	2.27	108.0	1.81	13.6	1.95	29.0	1.74	10.4
4	2.21	93.0	1.79	12.5	1.94	28.0	1.74	10.4
5	2.15	78.0	1.82	14.3	1.91	23.0	1.74	10.4
6	2.10	65.0	1.82	14.3	1.87	18.3	1.74	10.4
7	2.03	48.0	1.76	11.2	1.85	16.2	1.74	10.4
8	1.98	36.0	1.75	10.7	1.83	14.9	1.73	10.1
9	1.95	29.0	1.78	12.1	1.83	14.9	1.73	10.1
10	1.90	21.0	1.82	14.3	1.82	14.3	1.76	11.2
11	1.87	18.3	1.84	15.6	1.82	14.3	1.76	11.2
12	1.91	23.0	1.85	16.2	1.80	13.0	1.76	11.2
13	1.89	20.0	1.93	26.0	1.80	13.0	1.75	10.7
14	1.93	26.0	1.95	29.0	1.79	12.5	1.75	10.7
15	1.93	26.0	1.95	29.0	1.79	12.5	1.75	10.7
16	1.94	28.0	1.95	29.0	1.79	12.5	1.75	10.7
17	1.96	32.0	1.98	36.0	1.78	12.1	1.75	10.7
18	1.96	32.0	1.94	28.0	1.78	12.1	1.75	10.7
19	1.95	29.0	1.92	25.0	1.78	12.1	1.75	10.7
20	1.93	26.0	1.91	23.0	1.78	12.1	1.77	11.6
21	1.91	23.0	1.91	23.0	1.78	12.1	1.77	11.6
22	1.90	21.0	1.88	19.3	1.78	12.1	1.77	11.6
23	1.90	21.0	1.86	17.2	1.78	12.1	1.77	11.6
24	1.88	19.3	1.84	15.6	1.76	11.2	1.77	11.6
25	1.86	17.2	1.83	14.9	1.74	10.4	1.77	11.6
26	1.85	16.2	1.82	14.3	1.74	10.4	1.77	11.6
27	1.84	15.6	1.80	13.0	1.74	10.4	1.75	10.7
28	1.83	14.9	1.82	14.3	1.74	10.4	1.75	10.7
29	1.85	16.2	1.80	13.0	1.74	10.4	1.75	10.7
30	1.85	16.2	1.84	15.6	1.74	10.4	1.75	10.7
31	1.85	16.2	1.88	19.3	.....	.....	1.75	10.7

MONTHLY DISCHARGE of Nose Creek near Calgary, for 1913.

(Drainage area 294 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (10.30)	227	15.6	81.4	0.277	0.216	3,391
May	177	15.6	56.3	0.191	0.220	3,462
June	167	11.6	44.2	0.150	0.167	2,630
July	135	14.9	38.3	0.130	0.150	2,355
August	36	10.7	18.3	0.062	0.072	1,125
September	29	10.4	15.0	0.051	0.057	893
October	11.6	10.1	10.8	0.037	0.043	664
The period	.....	.....	.....	.....	0.925	14,520

CANADIAN PACIFIC RAILWAY COMPANY CANAL AT OGDEN.

This station was established May 18, 1911, by H. C. Ritchie. It is located at Bridge No. 3, about six miles below the headworks of main canal "A". It is on the N.E. ¼ Sec. 21, Tp. 23, Rge. 29, W. 4th Mer., one half mile from Ogden Post Office.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened in a wooden bay at the left bank, 100 feet upstream from the bridge. The gauge is referred to an iron post in the left bank, two feet from the lower end of the left abutment (elev. 13.35 above the zero of the gauge).

The channel is straight for about 300 feet above and 500 feet below the station. The banks are high, composed of clay and cut to a uniform slope. The bed is also composed of clay. The current is moderate and uniform.

Discharge measurements are made from the downstream side of the bridge, which is a wooden structure supported by piles. The initial point for soundings is a spike driven into the rail at the inner face of the left abutment.

The gauge was read during 1913 by A. Hatcher for the Canadian Pacific Railway Company.

An automatic gauge is maintained by the Company and is situated in the same position as the staff gauge. The readings of the automatic gauge were used as a check upon the observer's readings.

DISCHARGE MEASUREMENTS of Canadian Pacific Railway Company Irrigation Canal at Ogden, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 23	H. C. Ritchie	52.0	87.0	1.75	1.80	152
June 12	H. B. R. Thompson	55.0	135.0	1.75	2.57	235
June 24	do	53.0	104.0	1.87	2.06	196
July 14	P. H. Daniells	60.3	170.8	2.11	3.15	360
July 25	do	58.0	180.3	2.17	3.32	392
Aug. 5	do	44.0	62.0	1.11	1.45	69
Aug. 18	do	56.5	98.0	1.36	1.91	134
Aug. 27	do	56.0	133.0	1.58	2.55	210
Sept. 9	do	58.0	137.0	1.66	2.65	228
Sept. 19	do	63.0	203.9	2.25	3.95	455
Sept. 30	do	50.0	41.4	0.72	0.70	30

Daily Gauge Height and Discharge of Canadian Pacific Railway Company Irrigation Canal at Ogden, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.60	276	1.65	130
2			2.60	276	1.70	138
3			2.65	284	1.70	138
4			2.65	284	2.05	192
5			2.65	284	2.11*a*	201
6			2.65	284	2.18	212
7			2.60	276	2.25	222
8			2.60	276	2.30	230
9			2.80	307	2.40	246
10			3.00	338	2.30	230
11			3.05	346	2.30*a*	230
12			3.05	346	2.30*a*	230
13			3.00	338	2.30	230
14			3.20	369	2.25	222
15			2.25	222	2.30	230
16			2.20	215	2.25	222
17			2.20	215	2.20	215
18			1.85	161	2.20	215
19			1.80	153	1.80	153
20			1.80	153	1.90	169
21			1.80	153	2.15	207
22			1.80	153	2.10	199
23			1.90	169	2.20	215
24			2.00	184	1.90	169
25			2.10	199	1.92*a*	172
26	2.30*b*	230	2.10	199	1.95	176
27	2.40	246	2.05	192	2.15	207
28	2.50	261	2.00	184	2.20	215
29	2.40	246	2.00	184	1.50	107
30	2.50	261	1.65	130	1.50	107
31			1.65	130		

a Gauge height interpolated.
b Head gates opened.

DAILY GAUGE HEIGHT AND DISCHARGE of Canadian Pacific Railway Company Irrigation Canal, at Ogden, for 1913.—*Concluded.*

	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.50	107	2.00	135	2.20	161	0.50	22
2	1.70	138	1.85	117	2.20	161	b	
3	1.70	138	.90	39	2.40	189		
4	1.60	122	1.00	45	2.40	189		
5	1.50	107	1.10	51	2.30	175		
6	a 1.45	99	1.05	48	2.20	161		
7	1.40	92	1.05	48	2.60	220		
8	1.40	92	1.30	66	2.75	244		
9	1.95	176	2.00	135	2.60	220		
10	a 2.60	276	2.60	220	2.55	212		
11	3.25	376	2.50	204	2.40	189		
12	3.25	376	2.50	204	2.30	175		
13	a 3.15	361	2.40	189	3.90	446		
14	3.05	346	2.60	220	3.80	428		
15	2.50	261	2.70	236	3.80	428		
16	1.80	153	1.65	96	3.75	419		
17	a 1.70	138	1.50	82	3.60	392		
18	1.60	122	1.55	86	3.50	374		
19	a 1.85	161	1.10	51	3.75	419		
20	2.10	199	1.10	51	3.70	410		
21	2.10	199	1.00	45	2.70	236		
22	2.70	292	1.20	58	2.80	252		
23	a 2.90	323	.95	42	3.80	428		
24	3.10	353	1.75	106	3.90	446		
25	3.10	353	2.20	161	3.75	419		
26	3.25	376	2.30	175	3.60	392		
27	a 3.25	376	2.40	189	3.60	392		
28	3.25	376	2.30	175	2.50	204		
29	a 3.10	302	2.40	189	1.50	82		
30	2.25	168	2.30	175	0.75	32		
31	2.10	147	2.20	161				

a Gauge height interpolated.
b Head gates closed.

MONTHLY DISCHARGE of Canadian Pacific Railway Company Irrigation Canal, at Ogden, for 1913.

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (26-30)	261	230	249			2,469
May	369	130	238			14,634
June	246	107	194			11,544
July	376	92	229			14,081
August	236	39	123			7,563
September	446	32	283			16,840
October 1st	22	22	22			44
The period						67,175

FISH CREEK NEAR PRIDDIS.

This station was established May 13, 1907, by P. M. Sauder. It is on the S.W. ¼ Sec. 26, Tp. 22, Rge. 3, W. 5th Mer., about one mile from Priddis, and near Perceval's buildings.

A plain staff gauge, graduated to feet and hundredths, is placed vertically at the left bank, about 200 yards north of Mr. Perceval's house. The zero of the gauge (elev. 90.81) is referred to a permanent iron bench mark (assumed elev. 100.00) situated 36 feet west and a little south of the gauge.

The channel is straight for 300 feet above and 150 feet below the station. The left bank is high, and will not overflow. The right bank is low, covered with brush and timber, and is liable to overflow in extreme high water. The bed is composed of gravel, but not liable to shift. The current is sluggish in extreme low stages of the stream.

Measurements during low stages of the stream are made by wading at or near the gauge. High water discharges are computed from slope measurements by the use of Kutter's formula, or by gaugings made from the traffic bridge, about a mile upstream near Priddis post office.

During 1913, the gauge was read by Fred Perceval.

DISCHARGE MEASUREMENTS of Fish Creek near Priddis, in 1913.

Date.	Hydrographer.	Widht.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 25	F. R. Steinberger	38.0	40.6	0.67	1.33	27.0
May 15	do	83.0	91.2	2.32	2.80	212.0
June 6	do	41.5	53.6	0.96	1.69	53.0
June 27	do	57.5	86.8	3.04	2.72	264.0
July 14	do	40.4	51.8	1.07	1.70	56.0
Aug. 7	do	33.9	33.9	0.55	1.17	17.5
Aug. 26	do	32.4	31.5	0.44	1.09	13.7
Sept. 16	do	31.5	28.5	0.38	1.00	9.9
Oct. 5	do	32.7	31.7	0.50	1.12	15.8
Nov. 1	do	22.5	11.0	1.21	1.14	13.3

DAILY GAUGE HEIGHT AND DISCHARGE of Fish Creek near Priddis, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.25	22	1.46	35
2			1.29	24	1.45	34
3			1.31	26	1.45	34
4			1.37	29	1.47	35
5			1.39	30	1.49	36
6			1.30	25	1.55	41
7			1.37	29	1.69	53
8			1.35	28	1.56	42
9			1.37	29	1.56	42
10			2.19	115	1.45	34
11			2.93	289	1.45	34
12			2.55	188	1.45	34
13			2.75	237	1.46	35
14			2.77	243	1.46	35
15			2.90	280	1.38	30
16			2.60	200	1.34	27
17			2.45	164	1.34	27
18			2.45	164	1.29	24
19			2.11	103	1.30	25
20			2.09	101	2.90	280
21	1.75	59	2.10	102	2.28	131
22	1.55	41	1.99	87	2.00	88
23	1.44	33	1.90	75	1.71	55
24	1.35	28	1.86	70	1.66	50
25	1.34	27	1.73	57	1.80	64
26	1.33	27	1.70	54	2.20	117
27	1.32	26	1.63	47	2.70	224
28	1.28	24	1.60	45	2.90	280
29	1.38	30	1.63	47	3.00	310
30	1.40	31	1.57	43	2.47	169
31			1.55	41		

DAILY GAUGE HEIGHT AND DISCHARGE of Fish Creek, near Priddis, for 1913.—*Concluded.*

	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet*	*Sec.-ft..*
1	2.20	117.0	1.29	24.0	1.55	41.0	1.00	9.0
2	2.10	102.0	1.15	16.0	1.66	50.0	1.01	9.4
3	1.99	87.0	1.10	13.0	1.70	54.0	1.02	9.8
4	2.00	88.0	1.09	12.6	1.48	36.0	1.10	13.0
5	1.94	80.0	1.11	13.1	1.26	23.0	1.15	16.0
6	1.78	62.0	1.21	20.0	1.18	17.8	1.13	14.8
7	1.68	52.0	1.19	18.4	1.13	14.8	1.13	14.8
8	1.56	42.0	1.19	18.4	1.10	13.0	1.10	13.0
9	1.45	34.0	1 45	34.0	1.07	11.8	1 09	12.6
10	1.36	29.0	2.05	95.0	1.06	11.4	1.16	16.1
11	1.56	42.0	1.81	65.0	1.04	10.6	1.14	15.4
12	1.66	50.0	1.61	46.0	1.02	9.8	1.14	15.4
13	1.63	47.0	1.60	45.0	1.05	11.0	1.18	17.8
14	1.69	53.0	1.49	36 0	1.00	9.0	1.29	24.0
15	1.55	41.0	1.81	65.0	1.00	9.0	1.25	22.0
16	1.46	35.0	1.59	44.0	1.00	9.0	1.24	21.0
17	1.40	31.0	1.46	35.0	1.00	9.0	1.23	21.0
18	1.38	30.0	1.65	49.0	1.00	9.0	1.23	21.0
19	1.32	26.0	1.50	37.0	1.06	11.4	1.24	21.0
20	1.26	23.0	1.39	30.0	1.06	11.4	1.15	16.0
21	1.23	21.0	1.36	29.0	1.05	11.0	1.16	16.1
22	1.25	22.0	1.26	23.0	1.10	13.0	1.46	35.0
23	1.35	28.0	1.20	19.0	1.09	12.6	1.06	11.4
24	1.34	27.0	1.14	15.4	1.09	12.6	1.06	11.4
25	1.16	16.1	1.14	15.4	1.09	12.6	1.04	10.6
26	1.16	16.1	1.11	13.1	1.08	12.2	1.15	16.0
27	1.16	16.1	1.06	11.4	1.08	12.2	1.14	15.4
28	1.15	16.0	0 96	7.4	1.07	11.8	1.25	22.0
29	1.26	23.0	0.95	7.0	1.06	11.4	1.24	21.0
30	1.25	22.0	1.10	13.0	1.06	11.4	1.24	21.0
31	1.31	26.0	1.26	23.0	.....	.....	1.25	22.0

MONTHLY DISCHARGE of Fish Creek near Priddis, for 1913.

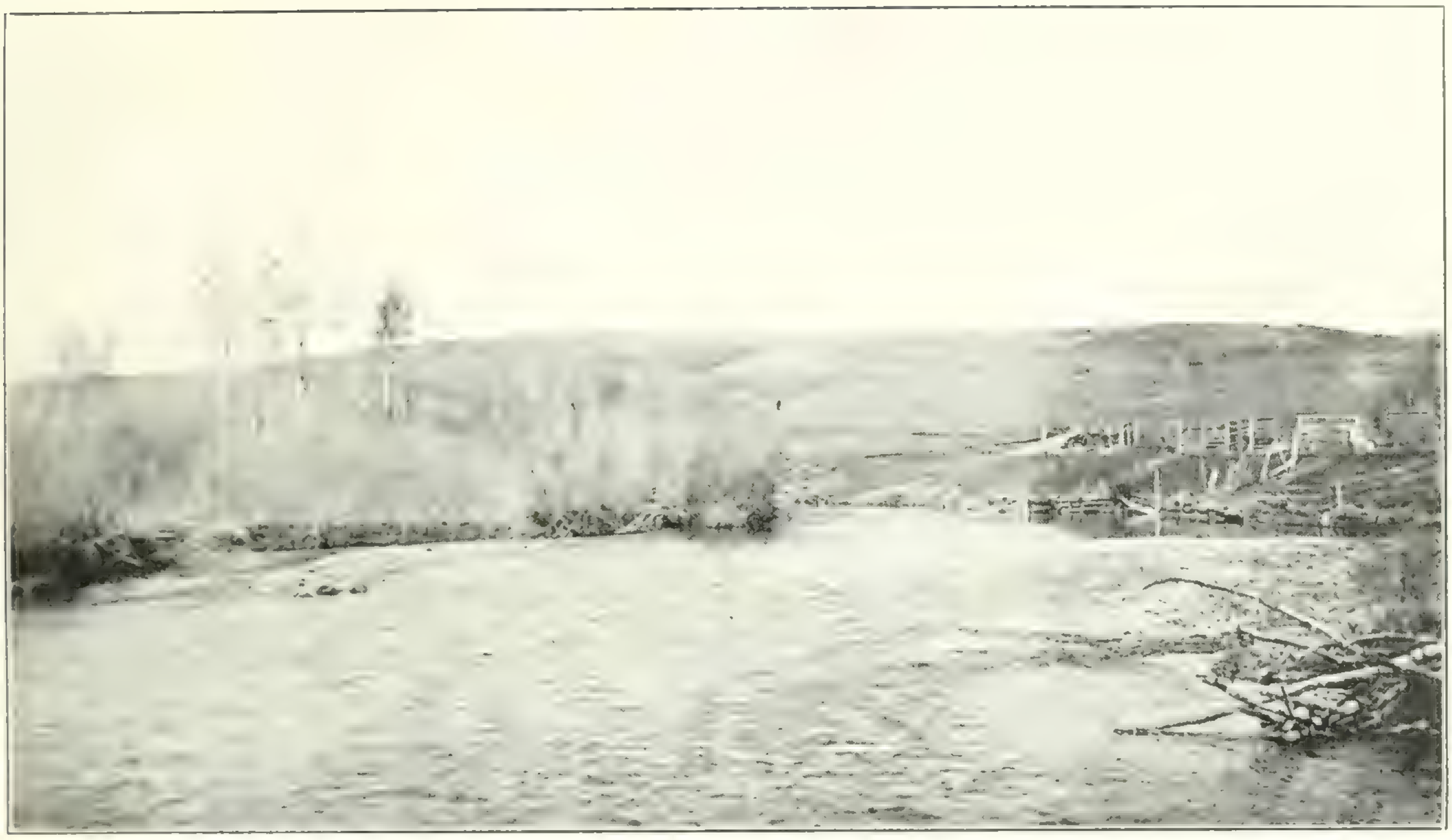
(Drainage area 109 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (21-30)	59.0	24.0	32.6	.300	0.11	647
May	289.0	22.0	96.6	0.886	1.02	5,940
June	310.0	24.0	80.8	0.741	0.83	4,808
July	117.0	16.0	42.1	0.386	0.44	2,589
August	95.0	7.0	28.8	0.264	0.30	1,771
September	54.0	9.0	16.4	0.150	0.17	976
October	35.0	9.0	16 9	0.155	0.18	1,039
The period	.....	.....	.....	.....	3.05	17,770

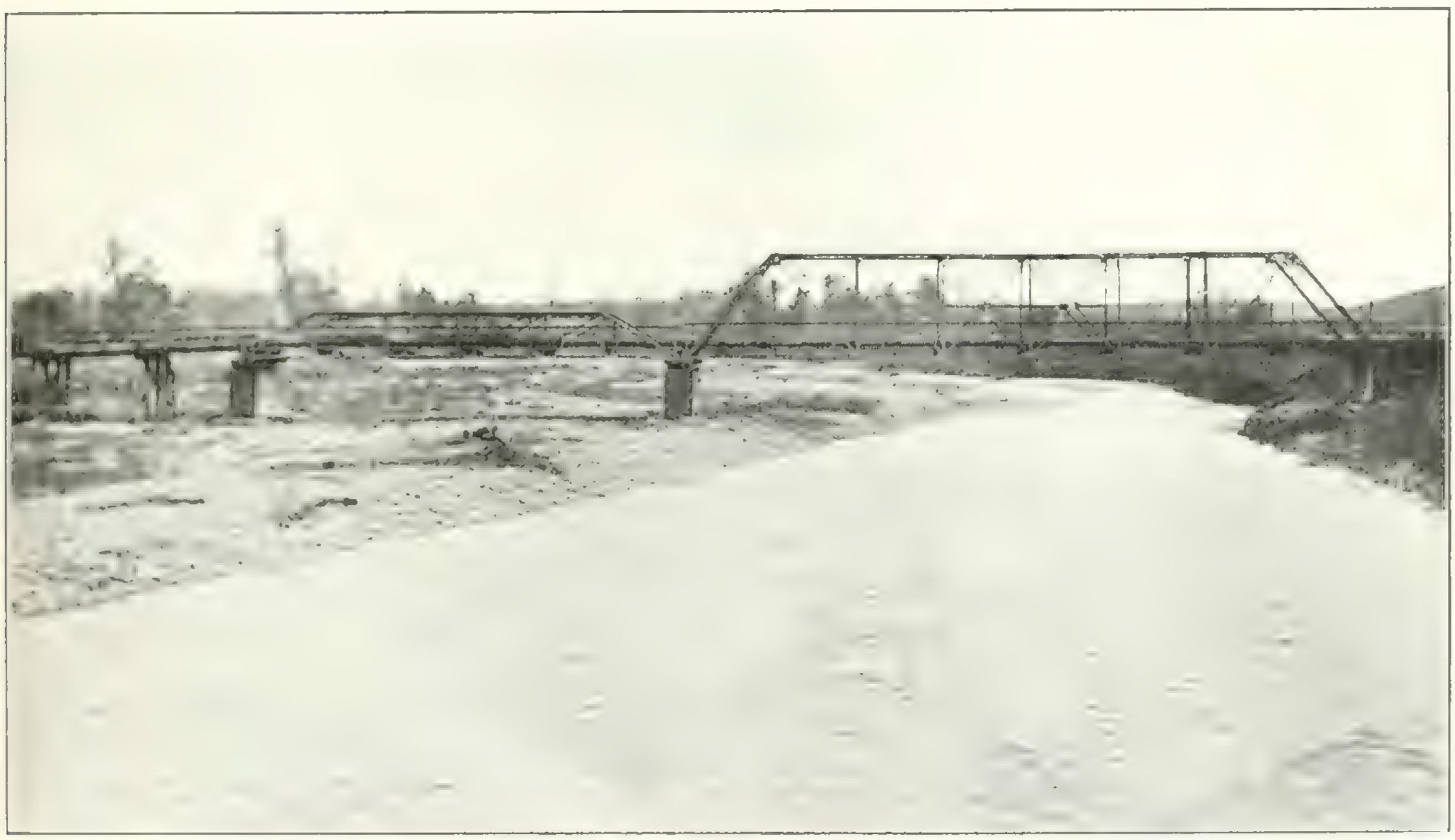
NORTH BRANCH OF SHEEP RIVER AT MILLARVILLE.

This station was established May 22, 1908, by P. M. Sauder. It is located on the S.W. ¼ Sec. 12, Tp. 21, Rge. 3, W. 5th Mer., 100 feet from Malcolm T. Millar's house.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the cribwork a the left side of the stream. The zero (elev. 82.67) is referred to a permanent iron bench mark (assumed elev. 100.00), situated 36 feet southwest of the N.E. corner of Sec. 2, Tp. 21, Rge. 3, W. 5th Mer., and about 100 yards west of the gauge.



Gauging Station on the North Branch of Sheep River at Millarville, Alberta.



Gauging Station on the South Branch of Sheep River, near Black Diamond, Alberta.

The channel is straight for about 300 feet above and below the station; the banks are high and clean and not liable to overflow and there will be but one channel at all stages.

During high water discharge measurements are made at the traffic bridge about one mile downstream, on the road allowance on the east boundary of Sec. 12. At low stages the stream is gauged at a wading section about 200 feet downstream from the gauge. The cross-section at the gauge is unsuitable for gauging, as the stream is very deep and sluggish at this point.

During 1913, the gauge was read once daily by Malcolm T. Millar.

DISCHARGE MEASUREMENTS of North Branch of Sheep River, at Millarville, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24	F. R. Steinberger	.....	184.0	0.25	2.60	46.0
May 14	do	82.5	269.4	1.54	3.76	416.0
June 5	do	65.0	198.0	0.50	2.92	100.0
June 28	do	86.5	293.8	1.83	3.95	540.0
July 12	do	67.5	206.8	0.57	2.99	119.0
Aug. 5	do	33.4	31.4	1.08	2.38	34.0
Aug. 24	do	37.0	41.5	1.37	2.69	57.0
Sept. 15	do	30.8	28.8	0.84	2.32	24.0
Oct. 3	do	30.2	25.9	0.62	2.26	16.2
Oct. 30	do	30.7	13.5	1.08	2.28	14.7

DAILY GAUGE HEIGHT AND DISCHARGE of North Branch of Sheep River at Millarville, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	2.28	19.2	3.03	130.0
2	.....	.....	2.41	28.0	2.98	117.0
3	.....	.....	2.51	36.0	2.95	110.0
4	.....	.....	2.31	21.0	2.95	110.0
5	.....	.....	2.44	30.0	2.94	108.0
6	.....	.....	2.46	32.0	2.99	120.0
7	.....	.....	2.51	36.0	3.13	158.0
8	.....	.....	2.55	40.0	3.13	158.0
9	.....	.....	2.71	60.0	2.98	117.0
10	.....	.....	3.01	125.0	2.93	105.0
11	.....	.....	3.21	182.0	2.97	115.0
12	.....	.....	3.15	164.0	2.93	105.0
13	.....	.....	3.81	412.0	2.93	105.0
14	.....	.....	3.95	546.0	2.93	105.0
15	3.41	248.0	3.58	317.0	2.75	66.0
16	3.26	197.0	3.40	244.0	2.73	63.0
17	2.96	112.0	3.40	244.0	2.73	63.0
18	2.90	98.0	3.33	220.0	2.68	55.0
19	2.95	110.0	3.18	173.0	2.81	78.0
20	2.98	117.0	3.18	173.0	3.13	158.0
21	2.83	83.0	3.18	173.0	3.13	158.0
22	2.66	52.0	3.42	252.0	3.03	130.0
23	2.66	52.0	3.31	213.0	2.85	87.0
24	2.51	36.0	3.22	185.0	2.85	87.0
25	2.41	28.0	3.20	179.0	3.03	130.0
26	2.53	38.0	3.20	179.0	3.44	259.0
27	2.46	32.0	3.22	185.0	3.74	398.0
28	2.46	32.0	3.22	185.0	3.88	491.0
29	2.36	24.0	3.19	176.0	3.84	462.0
30	2.31	21.0	3.03	130.0	3.84	462.0
31	.....		3.03	130.0		

DAILY GAUGE HEIGHT AND DISCHARGE of North Branch of Sheep River at Millarville, for 1913.—*Concluded.*

DAY	July		August		September		October	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.91	514.0	2.66	52.0	2.81	78.0	2.23	17.2
2	3.71	382.0	2.61	46.0	2.80	76.0	2.21	16.4
3	3.53	296.0	2.58	43.0	2.68	55.0	2.23	17.2
4	3.66	355.0	2.52	37.0	2.68	55.0	2.29	20.0
5	3.51	287.0	2.39	26.0	2.51	36.0	2.29	20.0
6	3.37	233.0	2.39	26.0	2.50	35.0	2.29	20.0
7	3.27	200.0	2.39	26.0	2.48	33.0	2.28	19.2
8	3.17	170.0	2.43	29.0	2.40	27.0	2.28	19.2
9	3.16	167.0	2.75	66.0	2.40	27.0	2.28	19.2
10	3.10	149.0	3.46	267.0	2.40	27.0	2.90	20.0
11	3.12	155.0	3.28	204.0	2.38	25.0	2.29	20.0
12	3.12	155.0	3.10	149.0	2.38	25.0	2.29	20.0
13	3.24	191.0	3.03	130.0	2.33	22.0	2.29	20.0
14	3.08	143.0	3.28	204.0	2.33	22.0	2.48	33.0
15	3.08	143.0	3.18	173.0	2.33	22.0	2.40	27.0
16	2.96	112.0	3.08	143.0	2.31	21.0	2.33	22.0
17	2.87	91.0	3.08	143.0	2.28	19.2	2.33	22.0
18	2.87	91.0	3.08	143.0	2.33	22.0	2.33	22.0
19	2.81	78.0	2.93	105.0	2.38	25.0	2.28	19.2
20	2.76	68.0	2.90	98.0	2.33	22.0	2.28	19.2
21	2.76	68.0	2.78	72.0	2.30	20.0	2.28	19.2
22	2.76	68.0	2.73	63.0	2.38	25.0	2.28	19.2
23	2.71	60.0	2.70	58.0	2.38	25.0	2.34	22.0
24	2.71	60.0	2.63	49.0	2.38	25.0	2.33	22.0
25	2.71	60.0	2.55	40.0	2.33	22.0	2.33	22.0
26	2.71	60.0	2.55	40.0	2.31	21.0	2.30	20.0
27	2.69	57.0	2.53	38.0	2.30	20.0	2.35	23.0
28	2.62	47.0	2.48	33.0	2.28	19.2	2.30	20.0
29	2.81	78.0	2.43	29.0	2.28	19.2	2.28	19.2
30	2.89	96.0	2.48	33.0	2.25	18.0	2.18	15.2
31	2.71	60.0	2.57	42.0	.....	.....	2.11	12.4

MONTHLY DISCHARGE of North Branch of Sheep River at Millarville, for 1913.

(Drainage area 194 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (15-30)	248.0	21.0	80.0	.412	0.24	2,539
May	546.0	19.2	165.1	.851	0.98	10,151
June	491.0	55.0	160.0	.825	0.92	9,521
July	514.0	47.0	151.0	.778	0.90	9,285
August	267.0	26.0	84.1	.434	0.50	5,171
September	78.0	18.0	29.6	.153	0.17	1,761
October	33.0	12.0	20.2	.104	0.12	1,242
The year	.....	.....	.....	.....	3.83	39,670

SOUTH BRANCH OF SHEEP RIVER NEAR BLACK DIAMOND.

This station was established May 23, 1908, by P. M. Sauder. It is located at the steel highway bridge on the road allowance between Secs, 8 and 17, Tp. 20, Rge. 2, W. 5th Mer. It is one half mile from Black Diamond.

The gauge, which is of the standard chain type, is fastened to the downstream side of the floor of the bridge, about midway between the west abutment and the centre pier. The zero of the gauge (elev. 93,66) is referred to a permanent iron bench mark (assumed elev. 100.00) located in front of the downstream end of the centre pier 75 feet north of the northeast corner of the N.W. ¼ Sec. 8, Tp. 20, Rge. 2, W. 5th Mer.

The channel is straight for about 150 feet above the station, then swings sharply to the left. It is straight for about 500 feet below the station, then turns gradually to the right. Both banks are composed of gravel. The right bank is low, partly covered with brush and overflows during the higher stages of the stream. The left bank is high and cannot overflow. The bed is composed of coarse gravel, and is permanent in low water stages of the stream, but a gravel bar at the right bank, which is covered durin high water stages, is liable to shift. The river has considerable fall and the current is swift.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the outer edge of the bed plate on the west end of the bridge. Distances from the initial point are marked at every five feet on the bottom chord of the bridge...

During 1913 the gauge was read by Herbert Arnold, merchant at Black Diamond.

DISCHARGE MEASUREMENTS of South Branch of Sheep River at Black Diamond, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24	F. R. Steinberger	69.0	75.0	0.95	0.62	71.0
May 14	do	79.0	127.0	2.14	1.30	273.0
June 5	do	85.5	150.0	3.02	1.59	452.0
June 28	do	109.2	216.4	4.37	2.27	947.0
July 12	do	78.6	122.3	2.36	1.27	289.0
Aug. 5	do	76.7	101.0	1.75	0.95	176.0
Aug. 23	do	77.2	107.0	1.93	1.04	207.0
Sept. 14	do	76.3	90.6	1.47	0.84	134.0
Oct. 3	do	74.1	82.0	1.32	0.73	108.0
Oct. 30	do	71.0	78.7	0.95	0.68	75.0

DAILY GAUGE HEIGHT AND DISCHARGE of South Branch of Sheep River at Black Diamond, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			0.51	37	1.63	480
2			0.56	51	1.78	581
3			0.61	66	1.58	449
4			0.48	28	1.68	513
5			0.53	42	1.70	526
6			0.55	48	1.68	513
7			0.60	63	1.78	581
8			0.58	57	1.73	546
9			0.63	72	1.73*a*	546
10			0.83	135	1.73	546
11			0.96	178	1.80	595
12			0.96	178	1.65	493
13			1.23	276	1.70	526
14	1.43	361	1.38	336	1.60	461
15	1.28	295	1.18	257	1.40	345
16	1.26	288	1.08	221	1.32	311
17	1.05	210	1.08	221	1.30	303
18	0.98	185	1.10	228	1.25	284
19	0.98	185	0.98	185	1.57*a*	442
20	1.10	228	0.98	185	1.70	526
21	1.03	203	1.06	214	1.48	388
22	0.86	144	1.26	288	1.30	303
23	0.71	96	1.26	288	1.28	295
24	0.66	81	1.41	350	1.40	345
25	0.61	66	1.41	350	1.82	609
26	0.64	75	1.56	436	2.10	816
27	0.56	51	1.71	533	2.20	890
28	0.56	51	1.88	653	2.40	1,038
29	0.51	37	1.86	638	2.20	890
30	0.51	37	1.74	553	2.10	816
31			1.76	567		

a Gauge heights interpolated.

DAILY GAUGE HEIGHT AND DISCHARGE of South Branch of Sheep River at Black Diamond, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.15	853	1.11	232	1.10	228	0.80	125
2	1.80	595	1.06	214	a 1.10	228	0.75	109
3	2.03	764	1.06	214	1.10	228	0.75	109
4	1.70	526	1.04	206	1.10	228	0.80	125
5	1.50	400	0.96	178	1.32	311	0.77	115
6	1.45	371	0.94	172	1.27	292	0.70	93
7	1.45	371	0.91	161	1.00	192	0.70	93
8	1.40	345	1.06	214	1.02	199	0.72	99
9	1.45	371	1.64	487	1.00	192	0.73	103
10	1.40	345	2.06	786	0.95	175	0.70	93
11	1.70	526	1.98	727	0.90	158	0.70	93
12	1.30	303	a 1.87	646	0.85	141	0.85	141
13	1.35	323	a 1.75	560	0.85	141	0.95	175
14	1.30	303	1.63	480	0.85	141	0.95	175
15	1.10	228	1.56	436	0.82	131	a 0.88	151
16	1.12	235	1.45	371	0.80	125	0.80	125
17	1.10	228	a 1.38	336	0.80	125	0.75	109
18	1.10	228	1.30	303	0.85	141	0.80	125
19	1.00	192	a 1.30	303	0.82	131	0.75	109
20	1.10	228	1.30	303	0.80	125	0.75	109
21	1.20	265	1.15	246	0.82	131	0.75	109
22	1.30	303	1.10	228	0.85	141	0.72	99
23	a 1.38	336	1.05	210	0.85	141	0.75	109
24	1.45	371	1.00	192	0.83	135	0.72	99
25	1.25	284	1.10	228	0.80	125	0.70	93
26	1.08	221	1.03	203	0.78	119	0.72	99
27	0.98	185	1.02	199	0.80	125	0.75	109
28	0.98	185	1.00	192	0.78	119	a 0.74	106
29	1.28	295	1.00	192	0.80	125	0.72	99
30	1.28	295	1.00	192	0.80	125	0.65	78
31	1.18	257	0.98	185	.....	.....	0.63	72

a Gauge height interpolated.

MONTHLY DISCHARGE of South Branch of Sheep River at Black Diamond, for 1913.

(Drainage area 236 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth. in inches on Drainage Area.	Total in Acre-feet.
April (14-30)	361	37	152	0.644	0.41	5,126
May	653	28	250	1.06	1.22	15,372
June	1,038	284	532	2.25	2.51	31,656
July	853	185	346	1.47	1.70	21,275
August	786	161	310	1.31	1.51	19,061
September	311	119	164	0.695	0.78	9,759
October	175	72	111	0.470	0.54	6,825
The period					8.67	109,074

SHEEP RIVER NEAR OKOTOKS.

This station was established May 25, 1908, by P. M. Sauder. It is located at the Canadian Pacific Railway bridge about one mile from Okotoks, on the N.W. ¼ Sec. 22, Tp. 20, Rge. 29, W. 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to the cribwork on the left side of the centre pier. There is also a plain staff gauge graduated to feet and tenths embedded in the cement on the left face of the centre pier near the downstream end, for use during flood stages. The gauges are referred to a bench mark on the top of the left abutment at the southwest corner. This is a Canadian Pacific Railway bench mark and

the elevation 3431.57 marked upon it, is used for reference. The elevation of the zero of the regular gauge is 3417.12 whilst that of the high water gauge is 2.00 feet higher.

The channel is straight for 500 feet above and below the station. The current is sluggish at the station, but swift both above and below. The right bank is high and not liable to overflow. The left bank is lower and may overflow in very high stages. Both banks are covered with brush and trees. The bed of the stream is composed of sand and gravel and is liable to shift. A number of piles, remnants of the old wooden bridge, still stand in the bed and affect the velocity observations.

Discharge measurements are made from the downstream side of the bridge, except in low water, when wading sections can be obtained.

During 1913 the gauge was read by Miss M. B. Henderson.

Discharge Measurements of Sheep River near Okotoks, in 1913.

Date	Hydrographer	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 23	F. R. Steinberger	100.0	324.0	0 71	2.60	230
May 12	do	98.0	380.0	1 24	2.93	472
June 3	do	105.2	264.2	2 24	3 21	591
June 22	do	104.6	229.5	1.89	2 99	434
July 15	do	103.0	201.2	1.66	2 87	335
Aug. 8	do	100.0	178.0	1.24	2.58	221
Aug. 22	do	101.0	203.0	1.61	2.78	327
Sept. 24	do	98.0	276.0	0.60	2.43	164
Oct. 2	do	98.0	275.0	0.51	2.37	139
Oct. 29	do	93.0	276.0	0.50	2.36	139

Daily Gauge Height and Discharge of Sheep River near Okotoks, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge	Gauge Height.	Discharge.
	Feet.	*Sec.-ft-*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.03	100*b*	2 25	105	3 35	701
2	3 93	150	2 27*a*	111	3 27*a*	638
3	3 87*a*	200	2 29*a*	117	3 20	584
4	3 80*a*	300	2 30	120	3 23	607
5	3 73	400	2 30*a*	120	3 23	607
6	4 73	500	2 30	120	3 30	661
7	4 28	600	2 35	136	3 33	685
8	4 03	700	2 41	157	3 43	765
9	3 78	800	2 46	175	3 43	765
10	3 78*a*	900*b*	2 63*a*	244	3 37	717
11	3 78	1,045	2 80	325	3 40	741
12	3 78*a*	1,045	3 13	533	3 20	584
13	3 78	1,045	3 45	781	3 35	701
14	3 20*a*	584	3 60	901	3 32*a*	677
15	2 63*a*	244	3 37	717	3 28	645
16	2 06	54	3 15	547	3 05	476
17	2 06	54	3 10	511	2 89	374
18	2 86	54	3 05	476	2 85	352
19	2 86*a*	54	3 00	442	3 00	442
20	2 86	54	2 95	410	3 57	877
21	2 11*a*	67	3 00*a*	442	3 30	661
22	2 36*a*	139	3 05	476	3 05	476
23	2 61	235	3 20	584	3 05*a*	476
24	2 56	214	3 20	584	3 05	476
25	2 51	194	3 30	661	3 12	757
26	2 43*a*	164	3 30	661	3 80	1,061
27	2 36	139	3 45*a*	781	4 17	1,357
28	2 34*a*	133	3 60	901	4 15	1,581
29	2 31*a*	123	3 50	821	4 07	1,277
30	2 28*a*	114	3 45	781	4 15	1,341
31			3 53	701		

a Gauge heights interpolated.
b Ice conditions, discharge estimated.

DAILY GAUGE HEIGHTS AND DISCHARGE of Sheep River near Okotoks, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.15	1,341	2.63	244	2.63	244	a 2.39	150
2	3.90	1,141	2.58	223	2.78	315	2.39	150
3	3.60	901	2.61	235	a 2.76	305	2.39	150
4	3.50	821	2.61	235	a 2.75	300	2.39	150
5	3.40	741	2.58	223	a 2.74	295	2.39	150
6	3.20	584	2.58	223	2.73	290	2.37	143
7	3.10	511	2.54	206	2.67	262	2.37	143
8	3.05	476	2.63	244	a 2.58	223	a 2.37	143
9	3.05	476	3.13	533	2.49	186	2.37	143
10	3.00	442	4.08	1,285	2.46	175	2.37	143
11	3.10	511	3.88	1,125	2.48	182	2.39	150
12	3.05	476	3.38	725	2.48	182	2.39	150
13	3.00	442	3.33	685	2.48	182	2.39	150
14	a 2.90	380	3.38	725	2.48	182	a 2.39	150
15	2.80	325	3.28	645	2.48	182	2.39	150
16	a 2.80	325	3.16	554	a 2.45	171	2.39	150
17	2.79	320	3.08	497	2.43	164	2.39	150
18	2.75	300	3.08	497	a 2.41	157	a 2.39	150
19	2.75	300	3.05	496	2.39	150	2.39	150
20	2.73	290	a 3.04	469	2.39	150	2.39	150
21	2.70	276	3.03	462	2.39	150	2.39	150
22	2.75	300	2.78	315	2.39	150	2.39	150
23	2.80	325	2.70	276	2.39	150	a 2.39	150
24	2.75	300	2.56	214	2.44	167	2.39	150
25	a 2.72	286	2.53	202	2.42	160	a 2.39	150
26	2.70	276	2.53	202	2.39	150	2.39	150
27	2.70	276	a 2.53	202	a 2.38	146	2.37	143
28	2.75	300	2.53	202	2.36	139	a 2.37	143
29	2.80	325	2.50	190	2.39	150	2.37	143
30	2.80	325	a 2.54	206	2.39	150	a 2.37	143
31	2.70	276	2.58	223	.....	.....	2.37	143

a Gauge heights interpolated.

MONTHLY DISCHARGE of Sheep River near Okotoks, for 1913.

(Drainage area 618 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	1,045	54	345	0.558	0.62	20,529
May	901	105	466	0.754	0.87	28,653
June	1,581	352	735	1.190	1.33	43,736
July	1,341	276	463	0.749	0.86	28,469
August	1,285	190	411	0.665	.77	25,271
September	315	139	194	.314	.35	11,544
October	150	143	148	0.239	0.28	9,100
The period	.....	.....	.....	.....	5.08	167,302

NORTH BRANCH OF HIGHWOOD RIVER AT BROWN'S RANCHE.

This station was established on July 27, 1912, by F. R. Burfield. It is located on the S.E ¼ Sec. 20, Tp. 18, Rge. 2, W. 5th Mer., about eight miles north of Pekisko and five miles west of Longview Post Office.

The gauge, which is a plain staff gauge graduated to feet and hundredths, is nailed to a post driven into the bed of the stream near the right bank. The zero (elev. 91.97) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank, 55 feet S. 70°. W. from the gauge.

The channel is straight for 300 feet above and below the gauge. The right bank is low and wooded, and may overflow in flood stages: the left bank is very high and rocky. The bed is of clean coarse gravel and shifts during floods. The current is swift.

Discharge measurements are made from the downstream side of the traffic bridge one and one half miles downstream with meter and weights, where also miscellaneous measurements were made previous to the establishment of the station.

During 1913 the gauge was read by B. F. Brown.

DISCHARGE MEASUREMENTS of North Branch of Highwood River, near Brown's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 1	F. R. Steinberger	121.0	136.8	1.59	0.83	218
May 22	do	151.5	244.9	2.57	1.35	631
June 13	do	174.5	408.8	3.75	2.65	1,534
July 3	do	183.8	323.9	3.23	1.80	1,054
July 21	do	148.5	185.0	2.46	1.10	455
Aug. 14	do	171.0	281.0	3.11	1.68	873
Sept. 2	do	133.3	170.7	2.52	1.12	433
Sept. 22	do	120.0	145.0	2.34	0.94	339
Oct. 11	do	120.0	131.0	2.17	0.83	283
Nov. 8	do	121.0	103.0	1.91	0.69	197

DAILY GAUGE HEIGHT AND DISCHARGE of North Branch of Highwood River near Brown's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			0.81	263	2.39	1,590
2			0.81	263	2.47	1,670
3			0.86	292	2.36	1,560
4			0.79	251	2.35	1,550
5			0.80	257	2.39	1,590
6			0.77	240	2.36	1,560
7			0.80	257	2.22	1,420
8			0.83	274	2.30	1,500
9			0.89	309	2.44	1,640
10			0.93	333	2.38	1,580
11			1.00	376	2.45	1,650
12			1.01	382	2.48	1,680
13			1.10	441	2.65	1,850
14	1.41	674	1.27	562	2.52	1,720
15	1.18	496	1.27	562	2.38	1,580
16	1.28	570	1.27	562	2.10	1,380
17	1.28	570	1.19	503	2.02	1,224
18	1.26	555	1.19	503	1.92	1,129
19	1.12	455	1.12	455	2.10	1,302
20	1.25	548	1.07	422	2.32	1,520
21	1.28	570	1.21	518	2.10	1,302
22	1.24	540	1.37	641	1.92	1,129
23	1.00	376	1.80	1,017	1.82	1,036
24	0.96	352	1.90	1,110	2.00	1,205
25	0.95	346	1.99	1,196	2.18	1,380
26	0.95	346	2.11	1,312	2.42	1,620
27	0.94	339	2.30	1,500	2.58	1,780
28	0.90	315	2.45	1,650	2.72	1,920
29	0.84	280	2.63	1,830	2.28	1,480
30	0.82	269	2.53	1,730	2.02	1,224
31			2.39	1,590		

DAILY GAUGE HEIGHT AND DISCHARGE of North Branch of Highwood River near Brown's Ranche, for 1913.—*Concluded.*

DAY	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.08	1,283	1.10	441	1.19	503	0.83	274
2	1.88	1,091	1.10	441	1.12	455	0.84	280
3	1.72	944	1.10	441	1.10	441	0.84	280
4	1.78	999	1.07	422	1.09	434	0.84	280
5	1 62	855	1.05	408	1.12	455	0.84	280
6	1 52	767	1.02	389	1.14	469	0.84	280
7	1.52	767	1.00	376	1.12	455	0.84	280
8	1.46	716	1.01	382	1.09	434	0.83	274
9	1.42	682	1.70	926	1.04	402	0.77	240
10	1 32	601	2.65	1,850	1.03	396	0.79	251
11	1.42	682	2.00	1,205	1.00	376	0.79	251
12	1.35	625	1.80	1,017	0 98	364	0.83	274
13	1.35	625	1.70	926	0.95	346	0.79	251
14	1.33	609	1 65	882	0.95	346	0 81	263
15	1.27	562	1.60	837	0.93	333	0.83	274
16	1.20	510	1.55	794	0.90	315	0.96	292
17	1.20	510	1.75	972	0.90	315	0.89	309
18	1.10	441	1.70	926	0.88	303	0.89	309
19	1.09	434	1.65	882	0.85	286	0.84	280
20	1.09	434	1.60	837	0.90	315	0.84	280
21	1.09	434	1.40	665	0.90	315	0.83	274
22	1.28	570	1.30	585	0.94	339	0.79	251
23	1.28	570	1.20	510	0.90	315	0 79	251
24	1.24	540	1.15	476	0.90	315	0 77	240
25	1.22	525	1.11	448	0.87	298	0 76	235
26	1.12	455	1.09	434	0.85	286	0.76	235
27	1.12	455	1.07	422	0.85	286	0.74	223
28	1.08	428	1.04	402	0.86	292	0.74	223
29	1.11	448	1.02	389	0.87	298	0.74	223
30	1.12	455	0.99	370	0.85	286	0.74	223
31	1.09	434	1.24	540	.....	.....	0.74	223

MONTHLY DISCHARGE of North Branch of Highwood River near Brown's Ranche, for 1913.

(Drainage area 465 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (14-30)	674	269	447	0.96	0.61	15,072
May	1,830	240	697	1.50	1.73	42,857
June	1,920	1,036	1,492	3.21	3.58	88,780
July	1,283	428	627	1.35	1.56	38,553
August	1,850	370	664	1.43	1.65	40,828
September	503	286	359	0.77	0.86	21,362
October	309	223	251	0.55	0.63	15,618
					10.62	263,070

PEKISKO CREEK AT PEKISKO.

This station was established on October 6, 1911, by L. R. Brereton. It is located on the N.W. ¼ Sec. 8, Tp. 17, Rge. 2, W. 5th Mer., about 200 yards from Mr. Geo. Lane's ranche house, and is about twenty-five miles southwest of High River.

The gauge, which is a plain staff, graduated to feet and hundredths, is spiked to a post driven into the bed of the stream at the right bank about 10 feet downstream from the bridge. The zero (elev. 93.90) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the left bank 125 feet N. 55° E. from the gauge.

The channel is straight for 200 feet above and 150 feet below the station. Both banks are fairly low, sparsely covered with brush and trees, and liable to overflow in high stages of the stream. The bed is composed of fine gravel.

Discharge measurements are made from a small suspension foot-bridge at high stages and at a wading section near the station in low water. The initial point for soundings is the stream side of the large tree on the left bank to which the end of the bridge is attached.

During 1913 the gauge was read by Mrs. R. W. L. Cowell.

DISCHARGE MEASUREMENTS of Pekisko Creek at Pekisko, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 30	F. R. Steinberger	54.0	32.2	1.07	1.43	34
May 21	do	45.5	48.9	1.54	1.78	76
June 11	do	48.5	44.7	1.59	1.75	71
July 1	do	55.0	62.2	2.51	2.18	156
July 19	do	52.5	56.4	0.48	1.43	27
Aug. 11	do	60.0	81.2	1.51	1.96	123
Aug. 30	do	52.2	49.7	0.50	1.37	25
Sept. 21	do	44.0	32.2	0.62	1.28	20
Oct. 9	do	45.0	36.1	0.57	1.33	21
Nov. 7	do	45.6	29.0	0.73	1.31	21

DAILY GAUGE HEIGHT AND DISCHARGE of Pekisko Creek at Pekisko, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.44	28	1.95	113
2	.....	.....	1.45	29	1.88	97
3	.....	.....	1.49	32	1.85	91
4	.....	.....	1.44	28	1.88	97
5	.....	.....	1.41	26	1.85	91
6	1.99	122	1.43	28	1.87	95
7	1.99	122	1.47	31	1.82	85
8	1.97	117	1.45	29	1.80	80
9	1.90	102	1.49	32	1.79	78
10	1.85	91	1.62	48	1.74	68
11	1.88	97	1.68	57	1.73	66
12	2.05	135	1.74	68	1.73	66
13	1.86	93	1.84	89	1.69	59
14	1.82	85	1.89	100	1.65	52
15	1.77	74	1.80	80	1.59	44
16	1.77	74	1.78	76	1.58	42
17	1.72	64	1.81	82	1.55	39
18	1.64	51	1.79	78	1.62	48
19	1.72	64	1.76	72	1.77	74
20	1.75	70	1.76	72	1.82	85
21	1.74	68	1.77	74	1.71	62
22	1.66	54	1.86	93	1.61	46
23	1.55	39	1.93	108	1.60	45
24	1.54	38	1.94	110	1.62	48
25	1.52	35	1.91	104	1.70	61
26	1.48	32	1.94	110	2.14	155
27	1.49	32	1.96	115	2.39	211
28	1.48	32	2.00	124	2.42	218
29	1.47	31	2.08	142	2.32	196
30	1.43	28	1.99	122	2.40	214
31	.....	.....	1.96	115	.....	.....

DAILY GAUGE HEIGHT AND DISCHARGE of Pekisko Creek at Pekisko, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.23	176	1.33	22	1.65	52.0	1.27	19.8
2	2.06	137	1.32	22	1.53	36.0	1.27	19.8
3	2.02	128	1.36	24	1.46	30.0	1.28	20.0
4	1.97	117	1.32	22	1.42	27.0	1.34	23.0
5	1.91	104	1.31	21	1.38	25.0	1.36	24.0
6	1.82	85	1.31	21	1.37	24.0	1.32	22.0
7	1.76	72	1.33	22	1.35	23.0	1.32	22.0
8	1.72	64	1.38	25	1.33	22.0	1.32	22.0
9	1.67	56	2.05	135	1.32	22.0	1.34	23.0
10	1.66	54	1.99	122	1.31	21.0	1.33	22.0
11	1.78	76	2.03	131	1.29	20.0	1.35	23.0
12	1.67	56	1.88	97	1.28	20.0	1.56	40.0
13	1.65	52	1.81	82	1.28	20.0	1.63	49.0
14	1.60	45	1.84	89	1.27	19.8	1.63	49.0
15	1.56	40	1.69	59	1.27	19.8	1.52	35.0
16	1.53	36	1.65	52	1.27	19.8	1.50	33.0
17	1.48	32	1.67	56	1.25	19.2	1.48	32.0
18	1.46	30	1.66	54	1.28	20.0	1.46	30.0
19	1.44	28	1.59	44	1.28	20.0	1.44	28.0
20	1.42	27	1.55	39	1.28	20.0	1.43	28.0
21	1.41	26	1.52	35	1.26	19.5	1.42	27.0
22	1.48	32	1.48	32	1.31	21.0	1.40	26.0
23	1.44	28	1.45	29	1.35	23.0	1.38	25.0
24	1.39	25	1.42	27	1.34	23.0	1.37	24.0
25	1.38	25	1.41	26	1.33	22.0	1.37	24.0
26	1.39	25	1.38	25	1.30	21.0	1.37	24.0
27	1.37	24	1.38	25	1.28	20.0	1.37	24.0
28	1.32	22	1.36	24	1.28	20.0	1.37	24.0
29	1.49	32	1.35	23	1.28	20.0	1.36	24.0
30	1.46	30	1.35	23	1.28	20.0	1.34	23.0
31	1.35	23	1.53	36	.....	.....	1.33	22.0

MONTHLY DISCHARGE of Pekisko Creek at Pekisko, for 1913.

(Drainage area 84 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (6-31)	135	28.0	70.0	0.833	0.77	3,471
May	142	26.0	74.0	0.881	1.02	4,550
June	218	39.0	91.0	1.080	1.20	5,415
July	176	22.0	55.0	0.655	0.76	3,382
August	135	21.0	47.0	0.560	0.65	2,890
September	52	19.2	23.0	0.274	0.31	1,369
October	49	19.8	26.8	0.319	0.37	1,648
The period	.....	.....	.....	.....	5.08	22,725

STIMSON CREEK NEAR PEKISKO.

This station was established on June 30, 1912, by F. R. Burfield, to replace the station established October 6, 1911, on the S.E. ¼ Sec. 14, Tp. 17, Rge. 2, W. 5th Mer. It is located on the N.W. ¼ Sec. 2, Tp, 17. Rge. 2, West of the 5th Mer., near E. R. Baker's ranche.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to a post driven into the bed of the stream near the right bank. The zero (elev. 90.20) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank 19.5 feet northwest of the gauge.



View of Pekisko Creek near Pekisko P.O., Alberta.



View of Willow Creek near Willows P.O., Alberta.

The channel is straight for 100 feet above and below the gauge. Both banks are fairly high, grassy and not liable to overflow. The bed is of gravel, clean, and not liable to shift.

Discharge measurements are made at a wading section about 15 feet downstream from the gauge. In high water, measurements may be made from a bridge about 10 feet upstream from the gauge.

During 1913 from April 12th to October 4th the gauge was read by E. R. Baker.

DISCHARGE MEASUREMENTS of Stimson Creek near Pekisko, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 30	F. R. Steinberger	24.0	21.4	0.63	1.69	13.5
May 20	do	28.0	29.4	1.21	1.85	36.0
June 10	do	35.0	28.0	1.19	1.75	33.0
July 1	do	35.0	42.2	2.65	2.39	130.0
July 19	do	30.1	48.0	0.26	1.54	12.7
Aug. 11	do	35.1	32.1	1.01	1.78	33.0
Aug. 30	do	14.4	4.2	0.99	1.34	4.1
Sept. 20	do	14.1	5.1	0.98	1.45	5.0
Oct. 8	do	16.7	6.7	1.62	1.49	10.9
Nov. 6	do	16.4	6.2	1.66	1.48	10.3

DAILY GAUGE HEIGHT AND DISCHARGE of Stimson Creek near Pekisko, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.62	18.0	1.72	25
2			1.59	16.1	1.75	27
3			1.56	14.5	1.75	27
4			1.56	14.5	1.70	23
5			1.62	18.0	1.72	25
6			1.66	21.0	1.78	29
7			1.64	19.3	1.75	27
8			1.62	18.0	1.72	25
9			1.79	30.0	1.72	25
10			1.86	37.0	1.80	31
11			1.86	37.0	1.82	33
12	3.10*b*	301.0	1.86	37.0	1.82	33
13	2.38	128.0	1.92	43.0	1.75	27
14	2.40	133.0	1.96	48.0	1.72	25
15	2.35	121.0	1.96	48.0	1.65	20
16	2.15	77.0	1.96	48.0	1.65	20
17	2.10	68.0	1.96	48.0	1.70	23
18	2.04	59.0	1.94	45.0	1.90	41
19	2.04	59.0	1.86	37.0	2.02	56
20	1.94	45.0	1.86	37.0	1.98	50
21	1.84	35.0	1.86	37.0	1.92	43
22	1.74	26.0	1.86	37.0	1.82	33
23	1.64	19.3	1.86	37.0	1.82	33
24	1.64	19.3	1.84	35.0	1.82	33
25	1.64	19.3	1.84	35.0	2.08	65
26	1.66	21.0	1.76	28.0	2.80	229
27	1.66	21.0	1.76	28.0	2.95	265
28	1.66	21.0	1.76	28.0	2.82	234
29	1.66	21.0	1.76	28.0	2.72	210
30	1.64	19.3	1.69	23.0	2.45	145
31			1.72	25.0		

b Observations commenced.

DAILY GAUGE HEIGHT AND DISCHARGE of Stimson Creek, near Pekisko, for 1913.—*Con.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.35	121.0	1.54	13.4	1.51	11.8	1.61	17.4
2	2.25	98.0	1.53	12.9	1.51	11.8	1.61	17.4
3	2.12	72.0	1.54	13.4	1.49	10.8	1.58	15.6
4	2.05	60.0	1.54	13.4	1.48	10.3	1.61	17.4
5	1.92	43.0	1.59	16.1	1.46	9.4	.....	.....
6	1.82	33.0	1.60	16.7	1.48	10.3	.....	.....
7	1.82	33.0	1.53	12.9	1.43	8.0	.....	.....
8	1.70	23.0	1.61	17.4	1.42	7.6	.....	.....
9	1.68	22.0	1.90	41.0	1.45	8.9	.....	.....
10	1.62	18.0	2.13	73.0	1.46	9.4	.....	.....
11	1.62	18.0	1.78	29.0	1.43	8.0	.....	.....
12	1.68	22.0	1.78	29.0	1.44	8.5	.....	.....
13	1.68	22.0	1.69	23.0	1.42	7.6	.....	.....
14	1.68	22.0	1.65	20.0	1.41	7.1	.....	.....
15	1.62	18.0	1.63	18.7	1.45	8.9	.....	.....
16	1.62	18.0	1.58	15.6	1.44	8.5	.....	.....
17	1.60	16.7	1.63	18.7	1.41	7.1	.....	.....
18	1.58	15.6	1.58	15.6	1.41	7.1	.....	.....
19	1.57	15.0	1.52	12.3	1.41	7.1	.....	.....
20	1.57	15.0	1.53	12.9	1.49	10.8	.....	.....
21	1.62	18.0	1.56	14.5	a 1.50	11.3	.....	.....
22	1.65	20.0	1.58	15.6	a 1.51	11.8	.....	.....
23	1.58	15.6	1.57	15.0	a 1.52	12.3	.....	.....
24	1.60	16.7	1.57	15.0	a 1.53	12.9	.....	.....
25	1.57	15.0	1.56	14.5	a 1.54	13.4	.....	.....
26	1.54	13.4	1.59	16.1	a 1.55	13.9	.....	.....
27	1.61	17.4	1.55	13.9	a 1.55	13.9	.....	.....
28	1.59	16.1	1.43	8.0	a 1 56	14.5	.....	.....
29	1.63	18.7	1.47	9.9	1.56	14.5	.....	.....
30	1.73	26.0	1.46	9.4	1.58	15.6	.....	.....
31	1.64	19.3	1.51	11.8	.....	.....	.....	.....

a Gauge heights interpolated.

MONTHLY DISCHARGE of Stimson Creek near Pekisko, for 1913.

(Drainage area 75 square miles).

MONTH.	DISCHRAGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (12-30)	301.0	19 3	63.9	0.852	0.60	2,408
May	48.0	14 5	31.5	0.420	0.48	1,937
June	265.0	20.0	62.7	0.836	0.93	3,731
July	121.0	13.4	29.1	0.388	0.45	1,789
August	73.0	8.0	18.3	0 244	0.28	1,125
September	15.6	7.1	10.4	0.139	0.16	619
October (1-4)	17.4	15.6	16.9	0.225	0.03	130
The period					2.93	11,739

FINDLAY AND MCDOUGAL DITCH NEAR HIGH RIVER.

This station was established on June 17, 1911, by J. C. Milligan. It is located on the S.W. ¼ Sec. 31, Tp. 18, Rge. 29, W. 4th Mer., about four and half miles west of the town of High River.

The gauge is a plain staff, graduated to feet and inches. It is nailed to a post driven into the left bank of the ditch. The zero (elev. 99.25) is referred to a permanent iron bench mark (assumed elev. 100.00) situated on the right bank, about 50 feet downstream from the gauge.

The channel is straight for 150 feet above and below the station. The right bank is built up from the excavation of the ditch, and would overflow if the headgates were opened to their fullest extent. The left bank is high and clean and will not overflow. The bed is of mud, but is not liable to shift.

Discharge measurements are made with meter and rods at a wading section near the gauge.

The gauge was not read during 1913 and in consequence the daily discharges cannot be computed.

DISCHARGE MEASUREMENTS of Findlay & McDougal Ditch near High River, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 1	F. R. Steinberger	4.0	1.00	0.48	0.63	0.48
May 22	do	6.3	1.87	0.31	0.68	0.58
June 13	do	7.0	5.60	0.52	0.97	2.90
July 4	do	7.5	6.00	0.55	1.30	3.30
July 22	do	8.0	6 80	0.62	1.27	4.20
Aug. 14	do	8.0	7.10	0.65	1.50	4.60
Sept. 2	do	8.0	6.00	0.58	1.30	3.10
Sept. 23	do	8.8	8.00	0.70	1.49	5.60
Oct. 12	do	7.0	6.10	0.51	1.31	4.00
Nov. 10	do	5.7	2.20	0.16	0.92	0.35

LITTLE BOW DITCH AT HIGH RIVER.

This station was established August 1st, 1910, by J. C. Keith. It is located on the S.W. ¼ Sec. 6, Tp. 19, Rge. 28, W. 4th Mer. 100 feet from the power station and pumping well of the town of High River.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to the left bank. The zero (elev. 92.07) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank 60 feet upstream from the gauge.

The channel is straight for several hundred feet above and below the station. Both banks are high, clean, and steep and will not overflow.

Discharge measurements are made by wading, or from planks laid across the ditch, with current meter and rods.

During 1913 the gauge was read daily by Philip Weinard.

This canal, about 2,000 feet in length, was built by the Alberta Government, to divert water from Highwood River into Little Bow River. At a point about two miles above the town of High River, water is turned from the Hoghwood River into a spring creek, and at the confluence of that creek with the Highwood a dam diverts the waters of spring creek into the Little Bow Ditch, and thence into the Little Bow River.

DISCHARGE MEASUREMENTS of Little Bow Ditch at High River, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 3	F. R. Burfield	16.7	26.0	1.05	1.20	27.0
Jan. 22	do	17.0	19.0	1.58	2.09	30.0
Mar. 15	H. O. Brown	11.7	12.9	2.58	1.19	33.0
April 28	F. R. Steinberger	17.0	27.0	1 06	1.13	29.0
May 19	do	17.0	28.1	1.07	1 30	30.0
June 9	do	17.8	39.7	1.54	1 90	61.0
June 30	do	17.8	34.9	1.41	1.65	49.0
July 17	do	16.9	24.1	0.89	0.96	22.0
Aug. 9	do	17.5	26.0	1.05	1.17	27.0
Aug. 28	do	17.3	27.4	1.08	1.16	30.0
Sept. 19	do	16.7	22.4	0.87	0.88	19.5
Oct. 7	do	17.1	25.4	1.08	1.14	27.4
Nov. 5	do	17.0	20.6	0.82	0.80	16.9
Dec. 11	J. S. Tempest	12.5	8.5	1.99	0.77	16.9
Dec. 22	do	12.2	7.2	1.65	0.74	11.9

Daily Gauge Height and Discharge of Little Bow Ditch at High River, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	b1.81	29	1.75	29	1.85	59	1.56	45	1.11	26	2.02	67
2	1.83	29	1.76	29	1.90	61	1.60	47	1.11	26	1.94	63
3	1.45	28	1.80	29	1.87	60	1.44	39	1.11	26	1.85	59
4	a3.00	33	2.15	30	1.66	49	1.48	41	1.11	26	1.89	60
5	a2.02	30	1.65	29	1.60	47	1.70	51	1.11	26	1.85	59
6	1.55	29	1.65	29	1.54	44	2.05	68	1.11	26	1.85	59
7	1.84	29	2.00	30	1.52	42	2.15	73	1.11	26	1.83	58
8	1.83	29	1.98	30	1.95	63	2.05	68	1.14	27	1.85	59
9	1.73	29	2.10	30	2.00	66	2.05	68	1.13	27	1.90	61
10	1.53	28	2.22	31	2.01	66	2.04	68	1.14	27	1.84	58
11	1.64	29	2.28	31	2.00	66	2.07	69	1.22	30	1.75	54
12	1.78	29	2.28	31	1.60	47	2.04	68	1.24	31	1.64	48
13	1.82	29	2.15	30	1.50	42	1.95	63	1.32	34	1.61	47
14	1.84	29	2.15	30	1.50	42	1.65	49	1.34	35	1.52	43
15	1.78	29	2.15	30	1.15	28	1.61	47	1.33	35	1.45	40
16	2.05	30	2.10	30	1.45	40	1.43	39	1.33	35	1.39	37
17	1.60	29	2.08	30	1.70	51	1.40	38	1.33	35	1.36	36
18	1.75	29	1.85	29	1.30	33	1.37	36	1.32	34	1.32	34
19	1.95	30	1.70	29	1.60	47	1.40	38	1.30	33	1.52	43
20	2.20	30	1.25	28	1.75	54	1.42	38	1.36	36	1.67	50
21	2.05	30	1.47	f 30	1.85	59	1.43	39	1.37	36	1.52	43
22	2.10	30	1.35	f 35	1.55	44	1.43	39	1.40	38	1.47	41
23	1.98	30	1.23	f 40	1.42	38	1.41	38	1.47	41	1.40	38
24	2.12	30	1.50	f 50	1.36	36	1.40	38	1.47	41	1.41	38
25	2.41	31	c 1.50	f 60	1.95	63	1.37	36	1.49	42	1.40	38
26	2.48	31	2.10	71	1.70	51	1.35	36	1.59	46	1.62	47
27	2.50	31	2.03	67	1.25	31	1.15	28	1.74	53	1.88	60
28	2.40	31	2.05	68	1.16	28	1.10	26	1.84	58	1.90	61
29	2.20	30	.....	.....	1.22	30	1.10	26	2.15	73	1.73	53
30	1.75	29	.....	.....	1.35	36	1.10	26	1.95	63	1.65	49
31	1.75	29	.....	.....	1.90	61	.....	.....	2.00	66	.....	.....

a High gauge height probably caused by jam.
b to c Ice conditions.
f Ice going out, discharge interpolated.

DAILY GAUGE HEIGHT AND DISCHARGE of Little Bow Ditch at High River, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.61	47	1.00	23	1.08	25.0	1.48	41.0	0.86	18.8	0.96	22.0
2	1.52	43	1.00	23	1.02	23.0	1.47	41.0	0.93	21.0	0.93	21.0
3	1.49	42	1.00	23	0.98	22.0	1.47	41.0	0.88	19.3	0.88	19.3
4	1.47	41	1.00	23	0.95	21.0	1.48	41.8	0.85	18.5	0.92	20.0
5	1.40	38	1.00	23	0.98	22.0	1.48	41.0	0.88	19.3	0.99	22.0
6	1.24	31	1.03	24	1.03	24.0	1.13	27.0	0.90	19.8	0.73	15.5
7	1.14	27	1.05	24	0.98	22.0	1.13	27.0	0.88	19.3	0.98	22.0
8	1.32	34	1.05	24	0.95	21.0	1.12	27.0	0.88	19.3	0.72	15.3
9	1.29	33	1.10	26	0.88	19.3	1.12	27.0	0.85	18.5	0.69	14.6
10	1.27	32	1.16	28	0.89	19.5	1.16	28.0	0.85	18.5	0.91	20.0
11	1.23	31	1.50	42	0.88	19.3	1.08	25.0	0.83	18.0	0.75	16.0
12	1.20	30	1.48	41	0.88	19.3	1.11	26.0	0.80	17.2	0.66	13.9
13	1.20	30	1.18	29	0.88	19.3	0.88	19.3	0.95	21.0	0.73	15.5
14	1.18	29	1.18	29	0.88	19.3	0.93	21.0	1.13	27.0	0.78	16.7
15	1.18	29	1.16	28	0.88	19.3	0.91	20.0	0.98	22.0	0.91	20.0
16	1.16	28	1.16	28	0.88	19.3	0.93	21.0	0.88	19.3	0.76	16.2
17	1.16	28	1.17	28	0.88	19.3	0.93	21.0	0.86	18.8	0.91	20.0
18	1.13	27	1.17	28	0.88	19.3	0.93	21.0	0.85	18.5	0.84	18.2
19	1.10	26	1.19	29	0.88	19.3	0.82	17.7	0.96	22.0	0.79	17.0
20	1.09	26	1.08	25	0.88	19.3	0.85	18.5	0.78	16.7	d 0.63	26.0
21	1.10	26	1.08	25	1.78	55.0	0.87	19.0	0.72	15.3	0.62	26.0
22	1.07	25	1.03	24	1.62	48.0	0.85	18.5	0.58	12.3	0.73	26.0
23	1.05	24	1.02	23	1.63	48.0	0.85	18.5	0.58	12.3	0.73	26.0
24	1.05	24	0.99	22	1.63	48.0	0.83	18.0	0.78	16.7	0.93	27.0
25	1.03	24	0.98	22	1.63	48.0	0.82	17.7	0.92	20.0	1.03	27.0
26	1.00	23	0.93	21	1.62	48.0	0.82	17.7	0.85	18.5	1.21	28.0
27	1.00	23	1.16	28	1.23	31.0	0.80	17.2	0.83	18.0	1.25	28.0
28	1.00	23	1.14	27	1.43	39.0	0.80	17.2	1.07	25.0	1.35	28.0
29	0.98	22	1.13	27	1.48	41.0	0.83	18.0	0.85	18.5	1.35	28.0
30	0.98	22	1.17	28	1.48	41.0	0.85	18.5	0.83	18.0	1.03	27.0
31	0.98	22	1.12	27	.....	.....	0.85	18.5	.....	.....	e 0.93	27.0

d to e Ice conditions.

MONTHLY DISCHARGE of Little Bow Ditch at High River, for 1913.

(Drainage area ..... square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	33	28.0	29.6	.....	.....	1,820
February	71	28.0	36.3	.....	.....	2,016
March	66	28.0	47.9	.....	.....	2,945
April	73	26 0	46.2	.....	.....	2,749
May	73	26 0	37.4	.....	.....	2,300
June	67	34 0	50.1	.....	.....	2,981
July	47	22 0	29.4	.....	.....	1,808
August	42	21 0	26.5	.....	.....	1,629
September	55	19.3	28.6	.....	.....	1,702
October	41	17.2	24.2	.....	.....	1,488
November	27	12.3	18.9	.....	.....	1,125
December	28	13.9	21.6	.....	.....	1,328
The year	.....	.....	.....	.....	.....	23,891

HIGHWOOD RIVER AT HIGH RIVER.

This station was first established some years ago, by the Irrigation Surveys. It was re-established on May 28, 1908, by P. M. Sauder. It is located at the highway bridge in the town of High River, on the N.W. ¼ Sec. 6, Tp. 19, Rge. 28, W. 4th Mer.

A plain staff gauge, graduated to feet and hundredths, is fastened vertically to the downstream face of the centre pier. The zero (elev. 9162) is referred to a bench mark (assumed elev. 100.00) on the southwest corner of the concrete pier supporting the north end of the Canadian Pacific Railway Bridge.

The channel is straight for about 300 feet above and below the station. The right bank is low and liable to overflow. It is composed of gravel and sand and covered with brush. The left bank is low, but is protected from overflow by a crib work. The current is swift at high stages of the stream, but is sluggish in low water.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the inside edge of the crib abutment, supporting the north end of the bridge. Distances are marked on the bottom chord of the bridge at every five feet from the initial point. There is an eddy about the centre pier and special care must be exercised by the hydrographer in making discharge measurements at this station. At extreme low water, a check measurement is made at a wading station about 300 yards below the bridge.

During a flood in 1908, Highwood River overflowed its left bank some distance above the traffic bridge and did considerable damage to property. To prevent a repetition of this occurrence, a highwater overflow channel has been constructed from the Lineham mill pond to the river. The water carried off through this spillway does not pass the gauging station. Miscellaneous measurements of this flow were made on the same day that Highwood River was measured. The discharge of this spillway and that of Little Bow Ditch should both be added to the discharge of Highwood River to obtain the total yield of the drainage area.

During 1913, from April 27th to December 31st the gauge was read by W. E. M. Holmes.

DISCHARGE MEASUREMENTS of Highwood River at High River, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 4	F. R. Burfield	70.0	49.0	1.16	1.62	57
Jan. 22	do	34.0	22.6	1.62	1.84	37
Mar. 15	H. O. Brown	40.0	27.8	1.54	1.65	43
April 28	F. R. Steinberger	130.0	408.0	0.88	2.44	362
May 19	do	141.0	479.6	1.24	2.83	594
June 9	do	149.5	738.8	2.78	4.32	2,000
June 30	do	147.0	717.6	2.44	4.00	1,748
July 17	do	138.0	482.5	1.01	2.73	486
Aug. 9	do	138.0	479.0	1.13	2.81	540
Aug. 29	do	124.2	417.9	0.86	2.50	359
Sept. 19	do	128.0	371.0	0.89	2.40	323
Oct. 7	do		359.0	0.66	2.18	241
Nov. 4	J. S. Tempest	134.0	134.0	1.69	2.12	226
Dec. 10	do	84.0	81.5	1.29	2.10	105
Dec. 20	do	77.5	50.7	0.83	1.50	42
Dec. 22	do	16.0	8.6	2.85	1.35	25

Daily Gauge Height and Discharge of Highwood River at High River, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	2.24	264	4.37	2,106	3.97	1,646
2	.....	.....	2.28	278	4.35	2,082	3.85	1,508
3	.....	.....	2.28	278	4.25	1,968	3.67	1,302
4	.....	.....	2.24	264	4.25	1,968	3.59	1,214
5	.....	.....	2.23	260	4.28	2,002	3.45	1,070
6	.....	.....	2.24	264	4.23	1,944	3.34	963
7	.....	.....	2.26	271	4.22	1,933	3.25	880
8	.....	.....	2.27	274	4.19	1,898	3.20	835
9	.....	.....	2.27	274	4.26	1,979	3.11	758
10	.....	.....	2.28	278	4.18	1,887	3.13	776
11	.....	.....	2.30	285	4.10	1,795	3.14	784
12	.....	.....	2.30	285	3.96	1,634	3.16	801
13	.....	.....	2.51	375	3.91	1,576	3.08	734
14	.....	.....	2.69	470	3.67	1,302	3.02	686
15	.....	.....	2.83	554	3.80	1,450	3.00	670
16	.....	.....	2.85	568	3.52	1,141	3.04	702
17	.....	.....	2.84	561	3.31	934	3.06	718
18	.....	.....	2.86	574	3.25	880	a 2.77	517
19	.....	.....	2.92	614	3.44	1,060	2.47	356
20	.....	.....	2.99	663	a 3.38	1,001	2.64	442
21	.....	.....	3.01	678	3.31	934	2.75	505
22	.....	.....	3.21	844	3.27	898	2.67	458
23	.....	.....	3.38	1,001	3.21	844	2.59	415
24	.....	.....	3.53	1,152	3.08	734	2.51	375
25	.....	.....	3.66	1,291	3.32	944	2.50	370
26	b	.....	3.82	1,473	3.37	992	2.59	415
27	2.50	370	3.94	1,611	3.78	1,427	2.57	405
28	2.39	321	4.03	1,714	3.95	1,622	2.53	385
29	2.34	301	4.36	2,094	4.04	1,726	2.49	366
30	2.29	282	4.35	2,082	4.01	1,692	2.47	356
31	.....	.....	4.47	2,220	.....	.....	2.48	361

a Gauge heights interpolated.
b No observations before April 27th.

Daily Gauge Height and Discharge of Highwood River at High River, for 1913. *Concluded.*

Day.	August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.50	370	2.62	431	2.15	235	2.26	271	2.17	116
2	2.48	361	2.58	410	2.15	235	2.25	268	2.16	115
3	2.46	352	2.56	400	2.13	229	2.18	244	2.19	118
4	2.67	458	2.55	395	2.25	268	2.12	226	2.22	121
5	2.89	594	2.54	390	2.19	247	2.12	226	2.21	120
6	a 2.89	594	2.51	375	2.21	254	2.12	226	2.21	120
7	a 2.90	600	2.49	366	2.10	220	2.09	218	2.06	104
8	a 2.90	600	2.48	361	2.09	218	2.02	200	1.98	95
9	a 2.91	607	2.47	356	2.11	223	2.07	212	1.94	90
10	a 2.91	607	2.44	343	2.16	238	2.05	208	2.11	109
11	a 2.92	614	2.42	334	2.13	229	2.05	208	2.13	111
12	a 2.92	614	2.40	325	2.29	282	2.05	208	2.11	109
13	a 2.93	621	2.35	305	2.46	352	1.97	189	2.13	111
14	a 2.93	621	2.35	305	2.57	405	1.79	153	2.01	98
15	a 2.94	628	2.33	297	2.53	385	2.25	268	2.03	100
16	a 2.95	635	2.30	285	2.42	334	2.22	257	2.03	100
17	a 2.95	635	2.27	274	2.39	321	2.14	232	1.95	92
18	2.96	642	2.31	289	2.38	317	2.09	218	1.73	67
19	2.87	580	2.38	317	2.34	301	1.90	174	1.71	65
20	2.84	561	2.33	297	2.31	289	1.98	191	1.52	44
21	2.81	542	2.25	268	2.30	285	1.81	157	1.42	33
22	2.78	523	2.31	289	2.29	282	1.97	189	1.35	26
23	2.71	481	2.33	297	2.28	278	b 2.15	114	1.39	30
24	2.69	470	2.30	285	2.27	274	2.37	138	1.52	44
25	2.68	464	2.25	268	2.26	271	2.72	176	1.75	70
26	2.68	464	2.25	268	2.25	268	2.44	145	1.75	70
27	2.67	458	2.25	168	2.28	278	2.39	140	1.75	70
28	2.69	470	2.25	268	2.24	264	2.35	136	1.77	72
29	2.68	464	2.25	268	2.21	254	2.28	128	1.78	73
30	2.53	385	2.18	244	2.20	250	2.25	124	1.89	85
31	2.49	366	.....	.....	1.85	164	.....	.....	1.79c	74

a Gauge height interpolated.
b to c Ice conditions.

Monthly Discharge of Highwood River at High River, for 1913.

(Drainage area 746 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	370	282	318	0.426	0.06	2,522
May	2,220	260	768	1.03	1.19	47,222
June	2,106	734	1,478	1.98	2.21	87,948
July	1,646	356	702	0.941	1.08	43,164
August	642	352	528	0.708	0.82	32,465
September	431	244	319	0.428	0.48	18,982
October	405	164	273	0.366	0.42	16,786
November	271	114	195	0.261	0.29	11,603
December	121	26	86	0.115	0.13	5,288
The period	.....	.....	.....	.....	6.68	265,980

HIGHWOOD RIVER NEAR ALDERSYDE.

This station was established October 3, 1911, by L. R. Brereton. It is located at the traffic bridge on the surveyed trail about one mile east of Aldersyde, in the N.W. ¼ Sec. 17, Tp. 20, Rge. 28, W. 4th Mer.

A chain gauge of the standard type was installed in 1913. It is fastened on the right span of the bridge. The length of the chain is 21.02 feet from bottom of weight to marker The zero (elev. 90.64) is referred to a permanent iron bench mark (assumed elev. 100.00) situated on the left bank, near the north end of the bridge.

The channel is straight for 1000 feet above and 150 feet below the station. Both banks are high, clear of brush and not liable to overflow. The bed is of coarse gravel with a scattering of large stones and boulders at and near the section. The latter affect the velocity observations to some extent. The current is swift.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the stream face of the north or left abutment.

During 1913 the gauge was read by L. W. Barrett.

The discharge of the Little Bow Ditch at High River should be added to those given to obtain the total yield of the drainage area.

DISCHARGE MEASUREMENTS of Highwood River near Aldersyde, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 26	F. R. Steinberger	91.0	167.0	2.00	1.42	335
May 13	do	134.0	235.9	2.14	1.82	505
June 4	do	209.3	428.4	4.62	2.83	2,090
June 23	do	170.0	320.6	2.87	2.17	921
July 16	do	158.3	264.9	2.15	1.93	568
Aug. 8	do	144.0	226.0	1.67	1.62	378
Sept. 5	do	147.5	236.4	2.06	1.75	487
Sept. 24	do	134.0	198.0	1.58	1.38	312
Oct. 15	do	140.0	222.0	1.94	1.63	429
Nov. 11	do	110.0	171.0	1.19	1.28	204

Daily Gauge Height and Discharge of Highwood River near Aldersyde, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.36	312	2.87	2,166
2			1.31	303	2.82	2,069
3			1.36	312	2.82	2,069
4			1.33	307	2.77	1,973
5			1.41	323	2.67	1,785
6			1.32	305	2.67*a*	1,785
7			1.29	300	2.67	1,785
8			1.37	314	2.72	1,878
9			1.32	305	2.75	1,935
10			1.40*a*	320	2.85	2,128
11			1.47	340	2.72	1,878
12			1.52	356	2.77	1,973
13			1.62	394	2.67	1,785
14			2.02	711	2.62	1,692
15	2.13	860	2.02	711	2.47	1,422
16	2.03	724	2.00	685	2.27	1,080
17	2.04	737	1.85	532	2.26*a*	1,064
18	1.67	416	1.75	460	2.24*a*	1,031
19	1.84	524	1.84	524	2.23	1,015
20	1.86	541	1.75	460	2.38*a*	1,266
21	2.02	711	1.71	436	2.52	1,511
22	1.99	674	1.71	436	2.34	1,198
23	1.77	472	1.95	630	2.17	920
24	1.75	460	2.05	750	2.26	1,064
25	1.53	359	2.24	1,031	2.52	1,511
26	1.42	326	2.32	1,164	2.77	1,973
27	1.51	352	2.34	1,198	2.92	2,265
28	1.52	355	2.64	1,729	3.14	2,705
29	1.46	337	2.84	2,108	2.82	2,069
30	1.41	323	2.89	2,206	2.83	2,088
31			2.97	2,365		

a Gauge heights interpolated.

DAILY GAUGE HEIGHT AND DISCHARGE of Highwood River near Aldersyde, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.73	1,897	1.88	558	1 40	320	1 30	301
2	2.51	1,493	1.84	524	1 38	316	1 30	301
3	2.57	1,501	1.78	478	1 34	309	1 30	301
4	2.45	1,388	1 80	490	1 50	348	1 33	307
5	2.35	1,215	1 76	466	1 48	342	1 32	305
6	2.35	1,215	1 68	421	1 47	340	1 33	307
7	2 22	998	1 65	407	1 55	366	1 35	310
8	2.15	890	1.65	407	1 50	348	1 35	310
9	2.13*a*	860	1 88*a*	558	1 45	334	1 34	309
10	2.11	830	2 12	845	1 45	334	1 33	307
11	2.15	890	1 85	532	1 44	331	1 35	310
12	2.08*a*	789	1 76	466	1 45	334	1.29	300
13	2.01	698	1 70*a*	430	1 43	328	1 40	320
14	2.12	845	1 65	407	1.40	320	1 50	348
15	2.01	698	1 54	363	1.43	328	1 64	403
16	1.91	586	1 46	337	1 40	320	1 58	378
17	2.47	1,422	1 56	370	1 38*a*	316	1 53	359
18	2.30	1,130	1 54	363	1 35	310	1 53	359
19	2.37	1,249	1.56	370	1 35	310	1 50	348
20	2.36	1,232	1 45	334	1 33	307	1 47*a*	340
21	2.35	1,215	1 50	348	1 34	309	1 44	331
22	2.35	1 215	1.48*a*	342	1.40	320	1 40	320
23	2.38	1,266	1.46	337	1 35*a*	310	1 38	316
24	2.44	1,370	1 45	334	1 30*a*	301	1 36	312
25	2.36	1,232	1 40	320	1 25	294	1 35	310
26	2.25*a*	1,048	1.38	316	1.30	301	1 34	309
27	2.14*a*	875	1.30	301	1.34	309	1 35	310
28	2.09	802	1.26	296	1 34	309	1.35	310
29	1.98	663	1.14	284	1 29	300	1 35*a*	310
30	2.00	685	1.22	291	1.37	314	1.35*a*	310
31	1.98	663	1.28	298			1.35	310

a Gauge height interpolated.

MONTHLY DISCHARGE of Highwood River near Aldersyde, for 1913.

(Drainage area 880 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (15-30)	860	323	511	0.581	0.35	16,217
May	2,365	300	720	0.818	0.94	44,271
June	2,705	920	1,703	1.94	2.16	101,336
July	1,897	586	1,060	1.20	1.38	65,180
August	845	284	406	0.461	0.53	24,964
September	366	294	324	0.368	0.41	19,279
October	403	300	322	0.366	0.42	19,800
					6.19	291,047

BOW RIVER NEAR NAMAKA.

This station was established in September, 1909, by P. M. Sauder. It was originally located on Sec. 31, Tp. 21, Rge. 25, W. 4th Mer. During 1911 and 1912 no records were obtained, on account of the interference of construction work on the Southern Alberta Land Company's dam, which crosses the river at Johnstone Island. In May, 1913, the station was moved by the Company to its present position one half mile above the dam, on the N. E. ¼ Sec. 32, Tp. 21, Rge. 25, W. 4th Mer.

The gauge is a 6″ x 2″ plank, graduated to feet and tenths and is driven into the river bed at the right bank. The gauge readings give the water elevation in feet above mean sea level, (C.P.R. datum. The elevation of the gauge is referred to a bench mark (elev. 2969.10) on a tree stump 30′ N. 80°. W. of the N. W. corner of the right cable tower.

The channel is straight for 1,000 feet above and 1,500 feet below the station. The right bank is low, gravelly and liable to overflow at high stages. The left bank is high, covered mostly with large boulders. and is not liable to overflow. The bed of the stream is rocky and is not liable to shift. There is one channel at all stages.

Discharge measurements are made by means of a cable and car. The initial point for soundings is the north face of the bottom stringer of the cable tower on the right bank.

During 1913, the gauge was read by R. B. Bowen, timekeeper in the employ of the Southern Alberta Land Company.

Discharge Measurements of Bow River near Namaka, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Aug. 2	F. R. Steinberger	358.0	1,788	3.94	57.65	7,055
Sept. 4	do	350.0	1,826	3.48	57.35	6,353
Sept. 15	T. H. Hatch	346.0	1,581	3.08	57.05	4,866
Oct. 9	do	340.0	1,374	2.52	56.45	3,461
Oct. 14	F. R. Steinberger	343.0	1,357	2.72	56.52	3,709
Oct. 30	T. H. Hatch	338.0	1,276	2.26	36.10	2,889
Nov. 12	F. R. Steinberger	336.0	1,146	2.18	56.09	2,498

Daily Gauge Height and Discharge of Bow River near Namaka, for 1913.

Day.	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	59.30	13,365	59.80	15,915	57.75	7,295	57.60	6,795	56.70	4,125
2	.....	.....	59.50	14,340	59.70	15,375	b57.70	7,125	57.80	7,460	56.70	4,125
3	.....	.....	59.70	15,375	59.50	14,340	57.65	6,960	57.60	6,795	56.60	3,870
4	.....	.....	59.70	15,375	59.20	12,900	57.95	7,970	57.35	5,995	56.60	3,870
5	.....	.....	59.75	15,645	59.10	12,450	57.85	7,630	57.40	6,150	56.60	3,870
6	.....	.....	59.75	15,645	58.80	11,160	57.90	7,800	58.45	9,770	56.60	3,870
7	.....	.....	59.75	15,645	58.70	10,750	57.90	7,800	58.25	9,030	56.55	3,745
8	.....	.....	59.60	14,850	58.50	9,960	58.00	8,145	58.00	8,145	56.50	3,620
9	.....	.....	59.75	15,645	58.70	10,750	58.12	8,565	57.75	7,295	56.50	3,620
10	.....	.....	60.20	18,225	58.50	9,960	59.55	14,595	57.60	6,795	56.50	3,620
11	.....	.....	60.55	20,445	58.40	9,580	59.25	13,130	57.60	6,795	56.40	3,380
12	.....	.....	60.80	22,140	58.40	9,580	59.00	12,010	57.72	7,190	56.40	3,380
13	a57.90	7,800	60 90	22,845	58.40	9,580	58.90	11,580	57.40	6,150	56.35	3,265
14	57.70	7,125	60.70	21,450	58.30	9,210	59.10	12,450	57.35	5,995	56.60	3,870
15	57.10	5,225	60.40	19,470	58.00	8,145	59.12	12,540	57.10	5,225	56.60	3,870
16	57.00	4,935	59.90	16,470	57.90	7,800	58.80	11,160	57.00	4,935	56.55	3,745
17	57.00	4,935	59.40	13,845	57.80	7,460	58.70	10,750	57.00	4,935	56.50	3,620
18	56.80	4,385	58.90	11,580	57.60	6,795	58.45	9,770	56.90	4,655	56.50	3,620
19	56.80	4,385	58.70	10,750	57.50	6,470	58.35	9,395	56.90	4,655	56.40	3,380
20	56.70	4,125	59.00	12,010	b57 50	6,470	58.20	8,850	56.90	4,655	56.40	3,380
21	56.70	4,125	59.50	14,340	57.70	7,125	58.00	8,145	57.00	4,935	56.35	3,265
22	56.70	4,125	59.50	14,340	58.00	8,145	57.90	7,800	56.95	4,795	56.30	3,150
23	56.90	4,655	59.20	12,900	58.20	8,850	57.70	7,125	56.90	4,655	56.30	3,150
24	57.05	5,080	59.00	12,010	58.25	9,030	57.60	6,795	56.85	4,520	56.30	3,150
25	57.40	6,150	59.10	12,450	58.20	8,850	57.60	6,795	56.75	4,255	56.20	2,925
26	57.60	6,795	59.60	14,850	58.15	8,675	57.50	6,470	56.65	4,000	56.20	2,925
27	58.00	7,460	60.20	18,225	58.15	8,675	57.50	6,470	56.60	3,870	56.20	2,925
28	58.30	9,210	60.40	19,470	58.10	8,495	57.50	6,470	56.60	3,870	56.20	2,925
29	58.55	10,155	60.10	17,625	58.10	8,495	57.50	6,470	56.55	3,745	56.20	2,925
30	59.20	12,900	59.90	16,470	58.00	8,145	57.55	6,630	56.55	3,745	56.10	2,710
31	59.30	13,365	.....	.....	57.85	7,630	57.55	6,630	.....	.....	56.10	2,710

a Observations commenced May 13.
b No observations between July 19 and Aug. 3. Gauge heights interpolated.

Monthly Discharge of Bow River near Namaka, for 1913.

(Drainage area 6,075 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (13 to 31)	13,365	4,125	6,681	1.10	0.78	251,779
June	22,845	10,750	15,926	2.62	2.92	947,666
July	15,915	6,470	9,573	1.58	1.82	588,560
August	14,595	6,470	8,752	1.44	1.66	538,140
September	9,770	3,745	5,727	0.943	1.05	340,780
October	4,125	2,710	3,439	0.566	0.65	211,450
The period					8.88	2,878,375

BOW RIVER NEAR BASSANO.

This station was established on August 20, 1909, by the Department of Natural Resources, Canadian Pacific Railway Company. The station was moved in May 1913 from its original position one mile above the Company's dam to a position one half mile below the dam. It is located near the quarter line of the S. ½ Sec. 2, Tp. 21, Rge. 19, W. 4th Mer., at the Horseshoe bend, three and one half miles southeast of the town of Bassano.

The gauge, which is a 2″ x 8″ timber graduated to feet and tenths, is driven into the bed of the river at the left bank at the cable, and stayed from the bank. The gauge readings give the water elevation in feet above mean sea level (C.P.R. datum). The elevation of the gauge is referred to a bench mark (elev. 2526.14) on a tree stump on the right bank, 27 feet and 16 feet from the upstream and downstream sides of the cable tower, respectively.

The channel is straight for about one half mile above and below the station. The left bank is high steep bluffs, clean and not liable to overflow. The right bank is high, lightly wooded and not liable to overflow. The bed of the stream is composed of large boulders which may shift at high stages. There is one channel at all stages.

Discharge measurements are made by means of a cable and car. The initial point for soundings is a stake on the left bank and the distances are marked on a tag wire upstream from the cable.

During 1913, the gauge was read by employees of the Canadian Pacific Railway, Department of Natural Resources. Readings were taken until July on a gauge at the dam, but these could not be used for computing daily discharge.

Discharge Measurements of Bow River near Bassano, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 10	F. S. Jackson	580.0	4,070	4.28	17.55	17,418
July 30	F. R. Steinberger	575.0	3,010	2.07	16.00	8,056
Aug. 12	F. S. Jackson	580.0	3,541	3.52	16.92	12,478
Aug. 16	F. R. Steinberger	578.0	3,671	3.20	16.75	11,708
Aug. 22	F. S. Jackson	550.0	2,836	2.79	16.00	7,921
Sept. 8	F. R. Steinberger	567.0	3,094	2.74	16.10	8,472
Sept. 26	do	558.0	2,420	1.70	14.85	4,111
Oct. 17	do	558.0	2,289	1.58	14.70	3,613
Nov. 17	do	535.0	2,093	1.29	14.35	2,700

DAILY GAUGE HEIGHT AND DISCHARGE of Bow River near Bassano, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			15.93	7,689	15.52	6,072	14.50	3,100
2			15.75	6,940	15.65	6,550	14.50	3,100
3			15.80	7,140	15.75	6,940	14.60	3,330
4			15.80	7,140	15.67	6,626	14.60	3,330
5			15.85	7,350	15.50	6,000	14.60	3,330
6			15.85	7,350	15.45	5,830	14.50	3,100
7			15.85	7,350	16.10	8,430	14.45	2,990
8			15.80	7,140	16.00	7,990	14.45	2,990
9			15.87	7,434	15.90	7,560	14.43	2,946
10			16.30	9,340	15.87	7,434	14.50	3,100
11			17.17	14,274	15.65	6,550	14.61	3,354
12			16.92	12,596	15.40	5,660	14.70	3,570
13			16.74	11,544	15.20	5,010	14.75	3,700
14			16.73	11,488	15.17	4,917	14.67	3,498
15			16.68	11,234	15.05	4,550	14.60	3,330
16			16.65	11,055	14.90	4,110	.....*b*	.....
17			16.60	10,790	14.80	3,830	.....	.....
18			16.42	9,906	14.80	3,830	.....	.....
19			16.32	9,434	14.80	3,830	.....	.....
20	15.45*a*	5,830	16.27	9,202	14.80	3,830	.....	.....
21	15.46	5,864	16.22	8,972	14.80	3,830	.....	.....
22	15.50	6,000	16.00	7,990	14.80	3,830	.....	.....
23	15.50	6,000	15.80	7,140	14.90	4,110	.....	.....
24	16.05	8,210	15.70	6,740	14.80	3,830	.....	.....
25	16.13	8,565	15.67	6,626	14.85	3,970	.....	.....
26	16.05	8,210	15.65	6,550	14.65	3,450	.....	.....
27	16.13	8,565	15.60	6,360	14.50	3,100	.....	.....
28	16.13	8,565	15.60	6,360	14.50	3,100	.....	.....
29	16.00	7,990	15.60	6,360	14.50	3,100	.....	.....
30	15.97	7,861	15.57	6,252	14.50	3,100	.....	.....
31	15.95	7,775	15.55	6,180	.....	.....	.....	.....

a Observations commenced at new station.
b Observations discontinued for the season.

MONTHLY DISCHARGE of Bow River near Bassano, for 1913.

(Drainage area 7,613 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile..	Depth in inches on Drainage Area.	Total in Acre-feet.
July (20 to 31)	8,565	5,830	7,453	0.978	0.40	177,391
August	14,274	6,180	8,449	1.11	1.28	519,513
September	8,430	3,100	5,032	0.661	0.74	299,429
October (1 to 15)	3,700	2,946	3,251	0.427	0.24	96,725
The period	.....	.....	.....	.....	2.66	1,093,058

Miscellaneous Discharge Measurements made in Bow River drainage basin, in 1913.

Date.	Hydrographer.	Stream	Location.	Width.	Area of Section.	Mean velocity.	Discharge.
				Feet.	*Sq. Ft.*	*Ft. per sec.*	*Sec.-ft.*
Jan. 2....	H. C. Ritchie....	Bath Creek.....	N.E. 32-28-16-5..	20.7	10.9	1.14	12.4
" 16....	do	do	do ..	16.6	15.5	0.76	11.8
" 31....	do	do	do ..	16.4	15.3	0.69	10.5
Feb. 10....	do	do	do ..	15.5	15.6	0.59	9.3
" 27....	do	do	do ..	16.2	15.7	0.64	10.1
Mar. 13....	do	do	do ..	16.4	14.8	0.60	8.9
" 26....	do	do	do ..	16.4	14.2	0.61	8.7
July 11....	do	Beaupre Creek....	N.E. 15-26-5-5..	5.4	2.44	0.94	2.3
" 24....	do	do	do ..	4.1	1.41	1.10	1.55
Aug. 7....	do	do	do ..	4.9	1.52	0.53	0.81
Sep. 18....	do	do	do ..	.....	.....	.....	*a* 0.50
Oct. 2....	G. R. Elliott....	do	do ..	3.0	0.36	0.50	0.18
" 16....	do	do	do .	4.3	1.22	0.98	1.19
" 30....	H. C. Ritchie....	do	do ..	.....	.....	.....	*a*0.50
July 11....	do	Bighill Creek.....	S.W 10-26-4-5...	11.2	7.64	1.75	13.3
" 24....	do	do	do ..	11.2	7.38	1.96	14.5
Aug. 7....	do	do	do ..	11.0	6.25	2.00	12.5
Sep. 18....	do	do	do ..	11.0	5.80	1.98	11.5
Oct. 2....	G. R. Elliott....	do	do ..	8.8	6.05	1.93	11.7
" 16....	do	do	do ..	11.3	6.38	1.64	10.5
" 30....	H. C. Ritchie....	do	do .	12.0	11.4	1.25	14.3
Jan. 3....	H. C. Ritchie....	Bow River.....	S.E. 28-28-16-5 .	41.0	61.2	1.12	67
Sep. 11....	do .	do ...	S.W. 32-26-14-5.	124.0	390	3.48	1,358
June 6....	F. R. Steinberger	Fish Creek(N.Bch)	S.E. 22-22-3-5 ..	21.0	25.2	0.66	14.5
" 27....	do	do	do .	30.0	35.5	2.94	105
Aug. 6....	do	do	do ..	18.8	18.4	0.50	9.2
" 27....	do	do	do ..	18.6	15.9	0.32	4.8
Sep. 17....	do	do	do .	17.0	15.0	0.28	4.2
Oct. 4....	do ..	do	do	18.7	17.2	0.44	7.4
" 31....	do	do	do	17.0	10.2	0.60	6.2
July 14....	do	Fish Creek S. Brch)	S.E. 22-22-3-5...	35.0	39.8	0.94	37
Aug. 6....	do	do	do .	22.4	17.2	0.55	9.5
" 27....	do	do	do ..	32.7	28.9	0.32	9.1
Sep. 17	do ..	do	do .	16.5	12.8	0.40	5.6
Oct. 4....	do	do	do .	15.5	10.3	0.87	9.0
" 31....	do	do	do	16.0	5.85	1.23	8.0
July 11....	H. C. Ritchie....	Grand Valley Ck..	S.W. 24-26-5-5..	11.5	9.08	1.25	11.3
" 24....	do	do	do ..	11.0	8.05	1.20	9.7
Aug. 7....	do	do	do .	11.1	7.32	0.77	5.6
Sep. 18....	do	do	do ..	8.0	5.60	0.71	4.0
Oct. 2....	G. R. Elliott....	do	do .	8.5	2.77	0.74	2.1
" 16....	do	do	do .	6.5	2.52	1.45	3.6
Oct. 30....	H. C. Ritchie....	Grand Valley Creek.....	S.W. 24-26-5-5..	7.0	2.80	1.90	5.3
Sep. 2....	do	Healey Creek..	S.W. 29-25-12-5..	49.9	56.9	1.94	111
July 11....	do	Horse Creek..	N.E. 8-26-4-5....	12.0	8.30	0.54	4.5
Aug. 7....	do	do	do	11.5	7.60	0.39	2.9
Sep. 18....	do	do	do .	.....	.....	.....	*a*0.50
Oct. 2....	G. R. Elliott....	do	do	9.5	5.44	0.23	1.26
" 16....	do	do ..	do	8.3	3.43	0.67	2.29
July 16....	H. C. Ritchie....	Lake Louise.....	N.W. 21-28-16-5.	6.6	5.06	2.00	10.1
" 31....	do	Tail-race of power house.....	do .	6.6	5.06	2.01	10.2
Aug. 14....	do .	do	do	6.9	6.88	2.16	14.9
Sep. 10....	do	do	do ..	6.6	5.06	2.01	10.2
" 24....	do	do	do ..	5.7	4.56	2.44	11 2
Oct. 10....	G. R. Elliott....	do ..	do .	5.3	3.33	2.81	9.4
" 25....	H. C. Ritchie....	do	do .	5.4	3.84	1.92	7.4
June 9....	F. R. Steinberger	Lineham Spillway ..	N.W. 6-19-28-4 .	9.5	8.20	1.16	9.5
" 30....	do	do .	do .	8.3	7.79	2.18	16.9
July 17....	do	do .	do ..	9.8	8.30	1.66	13.8
Aug. 9....	do	do .	do .	24.5	16.9	1.39	24
" 29....	do .	do .	do .	9.5	7.65	1.73	13.2
Sep. 19 .	do	do .	do	10.7	7.87	1.68	13.2
Oct. 7	do ..	do .	do .	9.9	8.35	2.04	17.0

a Estimated.

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Bow River drainage basin in 1913. (*Concluded.*).

Date.	Hydrographer.	Stream	Location.	Width.	Area of Section.	Mean Velocity.	Discharge
				Feet.	*Sq. ft.*	*Ft. per sec.*	*Sec. ft.*
Nov. 5....	F. R. Steinberger	Lineham Spillway.	N.W. 6-19-28-4..	11.0	6.35	1.36	8.6
July 15....	do ..	Pine Creek.....	N. E.11-22-1-5...	11.2	4.11	0.73	3.0
Aug. 7....	do ..	do	do ..	5.0	1.92	0.36	0.68
" 27....	do ..	do ..	do ..	6.5	2.40	0.42	1.02
Sep. 18....	do ..	do	do ..	5.0	1.50	0.66	1.00
Oct. 6....	do ..	do	do ..	6.4	2.28	0.92	2.11
Nov. 2....	do ..	do	do ..	5.5	1.90	0.38	0.74
July 11....	H. C. Ritchie....	Spencer Creek ..	.. S.E. 18-26-5-5.	10.0	5.90	1.34	7.9
" 24....	do	do	do ..	10.1	5.53	1.22	6.8
Aug. 7....	do	do	do ..	10.0	5.30	1.09	5.8
Sep. 18....	do	do	do ..	10.0	6.80	0.89	6.1
Oct. 2....	G. R. Elliott....	do	do ..	5.5	6.20	0.83	5.1
" 16....	do	do	do ..	5.5	5.09	1.00	5.1
" 30....	H. C. Ritchie....	do	do ..	7.8	4.96	0.74	3.7
Aug. 21....	do	Spray Lakes..... (overflow)	.. Sec. 30-22-10-5	.. 38.8	41.9	2.58	108
" 22....	do	Spray River..... (Channel 1)	do ..	81.5	154	3.94	608
" 22....	do	Spray River..... (Channel 2)	do ..	26.0	28.2	1.47	42
Aug. 23....	F. R. Steinberger	Spring Creek.....	N.E. 15-20-1-5...	4.5	1.10	0.57	0.64
Sep. 14....	do ..	do	S.W. 19-20-1-5...	4.5	1.63	0.50	0.81
" 14....	do ..	do	N.E. 15-20-1-5...	4.4	1.96	0.42	0.77
" 20....	do ..	do	N.E. 10-17-1-5...	.....	.....	.....	*b*0.18
Oct. 8....	do ..	do	do ..	.....	.....	.....	*b*0.25
Nov. 6....	do ..	do	do ..	.....	.....	.....	*b*0.27
July 18....	do ..	Tongue Flag Creek.	S.E. 24-19-29-4 .	6.3	1.97	0.84	1.66
Aug. 28....	do ..	do ..	do ..	6.0	2.80	0.45	1.27
Sep. 11....	H. C. Ritchie....	Vermilion Creek...	S.W. 32-26-14-5..	27.5	29.8	2.89	86

b Weir measurement.

LITTLE BOW RIVER DRAINAGE BASIN.

General Description.

The source of Little Bow River is a spring in the Town of High River in section 6, township 19, range 28, west of the fourth meridian. From here it flows in a southeasterly direction for one hundred miles and empties into the Belly River. In the first few miles, the natural flow is dependent entirely on a number of small springs and coulees which are dry most of the year, but later is augmented by the flow from Mosquito Creek, which drains the south and westerly part of the drainage basin.

There is a comparatively large flow in this stream during the spring freshets, but during summer it would under natural conditions dry up. There are a large number of ranchers and settlers on this stream and it is very important that there should be a good flow for domestic and stock watering purposes. For this reason, the Provincial Government has constructed a canal and diverts water from Highwood River into Little Bow River whenever required.

MOSQUITO CREEK NEAR NANTON.

This station was established August 1, 1908, by H. C. Ritchie. It is located at a traffic bridge, about four miles from Nanton, on the road from Nanton to Cayley. The bridge is on a road diversion on the N.E. ¼ Sec. 30, Tp. 16, Rge. 28, W. 4th Mer

The gauge, which is a plain staff graduated to feet and hundredths, is fixed in a stilling box in the left bank a few yards upstream from the bridge. It is referred to two spike heads on the south side of the bridge pier at the right bank; elevation 10.22 above the zero of the gauge.

The channel is straight for about 175 feet below the station, then curves to the left. Above the station the channel curves slightly to the left for about 500 feet, then it turns sharply to the left. The right bank is low near the water's edge but is high a few feet from it. Sand and mud deposit on this bank in high water. The left bank is high and is of solid clay with a few boulders. There is only one channel at low water. The bridge piers divide the stream into three channels at flood stage.

Discharge measurements are made from the bridge at high water and flood stages. The initial point for soundings is the north end of the bridge The current is very sluggish at the bridge during low water and during this stage discharge measurements are made at wading sections above or below the bridge.

During 1913, the gauge was read by Wm. Monkman.

Discharge Measurements of Mosquito Creek near Nanton, in 1913.

Date.	Hydrogrpaher.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 14	H. O. Brown	37.5	43.40	1.59	3.23	69.0
May 6	J. S. Wright	23.7	15.70	0.63	2.34	9.9
May 30	R. Palmer	28.0	19.60	0.70	2.40	13.7
June 19	do	27.0	21.99	0.48	2.30	10.5
July 12	do	55.0	65.10	1.23	2.99	80.0
Aug. 1	do	35.5	34.70	0.53	2.70	18.4
Aug. 20	do	33.0	30.50	0.55	2.60	16.9
Sept. 8	do	25.5	22.90	0.30	2.40	6.9
Sept. 24	do	33.5	31.00	0.42	2.30	13.1
Oct. 13	do	26.0	20.10	0.30	2.37	5.9
Nov. 13	do	24.0	15.40	0.26	2.20	4.1

Daily Gauge Height and Discharge of Mosquito Creek near Nanton, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.44	15.1	2.40	13.7
2			2.42	14.4	2.42	14.4
3			2.42	14.4	2.38	13.0
4			2.40	13.7	2.38	13.0
5			2.40	13.7	2.39	13.4
6			2.42	14.4	2.38	13.0
7			2.44	15.1	2.40	13.7
8			2.48	16.6	2.40	13.7
9			2.50	17.4	2.41	14.0
10			2.54	19.2	2.42	14.4
11			2.50	17.4	2.40	13.7
12			2.70	27.0	2.40	13.7
13			2.80	33.0	2.38	13.0
14			3.00	48.0	2.40	13.7
15			2.85	37.0	2.38	13.0
16			2.80	33.0	2.37	12.7
17			2.67	26.0	2.38	13.0
18			2.62	23.0	2.40	13.7
19			2.57	20.0	2.44	15.1
20	2.80*a*	33.0	2.50	17.4	2.44	17.6*c*
21	2.83	35.0	2.48	16.6	2.42	18.0
22	2.82	35.0	2.47	16.2	2.44	22.0
23	2.78	32.0	2.45	15.4	2.48	26.0
24	2.74	30.0	2.42	14.4	2.60	35.0
25	2.68	26.0	2.40	13.7	2.80	52.0
26	2.62	23.0	2.42	14.4	3.20	92.0
27	2.58	21.0	2.44	15.1	3.50	120.0
28	2.54	19.2	2.44	15.1	3.40	112.0
29	2.48	16.6	2.42	14.4	3.20	94.0
30	2.42	14.4	2.40	13.7	3.10	86.0
31			2.40	13.7		

a Observations commenced.
c Shifting conditions from June 20 to July 12.

Daily Gauge Height and Discharge of Mosquito, near Nanton, for 1913.—*Concluded*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.00	77.0	2.78	28.0	2.50	10 4	2.40	7.2
2	3 00	78.0	2.78	28.0	2.60	14.8	2.40	7.2
3	2.90	69.0	2.78	28.0	2.58	13.8	2 45	8.7
4	2.87	66.0	2.78	28.0	2.50	10.4	2 47	9.4
5	2.70	52.0	2.78	28.0	2.50	10.4	2 47	9.4
6	2.70	52.0	2.80	30.0	2.45	8.7	2 45	8.7
7	2.60	44.0	2 90	43.0	2.40	7.2	2.45	8.7
8	2 60	45.0	3.00	88.0	2.40	7.2	2.47	9.4
9	2.60	45.0	3 10	168.0	2 38	6.7	2 50	10.4
10	2.70	53.0	3.10	168.0	2 37	6.5	2.47	9.4
11	2.84	66.0	2.80	30.0	2 35	6.0	2 45	8.7
12	2.90	71.0*c*	2.70	21.0	2 33	5.6	2.40	7.2
13	2.90	43 0	2.70	21.0	2 30	5 0	2 37	6.5
14	2 80	30.0	2.60	14 8	2 30	5 0	2 37	6.5
15	2 80	30.0	2 60	14 8	2 30	5.0	2.35	6.0
16	2.70	21.0	2.80	30.0	2.30	5.0	2.35	6.0
17	2.70	21.0	2.80	30.0	2 30	5 0	2 37	6.5
18	2.60	14.8	2.80	30 0	2 33	5.6	2.35	6.0
19	2.60	14.8	2.70	21.0	2.35	6.0	2.37	6.5
20	2.60	14.8	2.60	14.8	2 33	5.6	2.35	6.0
21	2.60	14.8	2.60	14.8	2 30	5 0	2.35	6.0
22	2.60	14.8	2 50	10.4	2 35	6 0	2 37	6.5
23	2.60	14.8	2.50	10.4	2 35	6 0	2 35	6.0
24	2.60	14.8	2.50	10.4	2.37	6.5	2.35	6.0
25	2.60	14.8	2.50	10.4	2.37	6.5	2.35	6.0
26	2.60	14.8	2.40	7.2	2 35	6 0	2 37	6.5
27	2.65	17.6	2.37	6.5	2.35	6.0	2 40	7.2
28	2.70	21.0	2.30	5.0	2.35	6.0	2.40	7.2
29	2.78	28.0	2.30	5.0	2.37	6.5	2 38	6.7
30	2.80	30.0	2.40	7.2	2.37	6.5	2.37	6.5
31	2.78	28.0	2.50	10.4			2.37	6.5

c Shifting conditions from June 20 to July 12.

Monthly Discharge of Mosquito Creek near Nanton, for 1913.

(Drainage area 186 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Aera.	Total in Acre-feet.
April (20-30)	35.0	14.4	25.90	0.139	0.06	565
May	48.0	13.9	19.30	0.104	0.12	1,187
June	120.0	12.7	31.10	0.167	0.19	1,851
July	78.0	14.80	36.20	0.194	0.22	2,226
August	168.0	5.00	31.00	0.166	0.19	1,906
September	14.8	5.00	7.03	0.038	0.04	418
October	10.4	6.00	7.27	0.039	0.04	447
The period					0.86	8,600

NANTON CREEK NEAR NANTON.

This station was established August 3, 1908, by P. M. Sauder. It was originally located on the N.W. ¼ Sec. 20, Tp. 16, Rge. 28, W. 4th Mer., but was moved in September 1913, by R. Palmer to the S.E. ¼ Sec. 19, Tp. 16, Rge. 28, W. 4th Mer., The station is at the wooden highway bridge three and one half miles northwest of the village of Nanton and one half mile south of Mr. Monkman's house.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to the south abutment of the bridge. The zero of the gauge (elev. 93.33) is referred to a permanent iron bench mark (assumed elev. 100.00), situated at the old station on the right bank.

The channel is straight for 50 feet above and below the station. Both banks are high, grassy and not liable to overflow. The bed of the stream is composed of gravel, not liable to shift.

Measurements are made 50 feet downstream from the gauge, by wading. The initial point for soundings is a stake at the left bank.

During 1913, from September 9th to October 31st, the gauge was read by W. Monkman. During the earlier part of the season no observer was available.

DISCHARGE MEASUREMENTS of Nanton Creek near Nanton, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 14	H. O. Brown	13.8	14.40	1.00	6.12	14.4
May 6	J. S. Wright	.....	5.74	0.78	3.67	4.5
May 30	R. Palmer	6.8	5.64	0.70	6.34	4.0
June 19	do	8.0	6.78	0.79	6.20	5.4
July 12	do	7.5	10.20	1.67	..... *a*	17.0
Aug. 1	do	6.5	7.64	1.21	.....	9.3
Aug. 20	do	12.9	7.20	0.91	.....	6.6
Sept. 8	do	11.5	5.45	0.66	1.95	3.6
Sept. 24	do	12.5	5.85	0.72	1.95	4.2
Oct. 13	do	13.0	6.39	0.75	2.00	4.8
Nov. 13	do	12.5	6.27	0.77	2.00	4.8

a — Gauge out.

DAILY GAUGE HEIGHT AND DISCHARGE of Nanton Creek near Nanton, for 1913.

Day.	September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.92	3.6
2	.....	.....	1.95	3.9
3	.....	.....	1.92	3.6
4	.....	.....	1.95	3.9
5	.....	.....	2.00	4.8
6	.....	.....	2.00	4.8
7	.....	.....	1.98	4.4
8	1.95	3.9	1.98	4.4
9	1.95	3.9	2.00	4.8
10	1.90	3.3	1.98	4.4
11	1.90	3.3	1.97	4.2
12	1.90	3.3	1.97	4.2
13	1.90	3.3	2.00	4.8
14	1.90	3.3	1.98	4.4
15	1.85	2.9	1.97	4.2
16	1.90	3.3	1.98*a*	4.4
17	1.90	3.3	1.98	4.4
18	1.92	3.6	1.98	4.4
19	1.90	3.3	1.97	4.2
20	1.90	3.3	1.95	3.9
21	1.80	2.6	1.95	3.9
22	1.85	2.9	1.93	3.6
23	1.87	3.1	1.90	3.3
24	1.84	2.8	1.90	3.3
25	1.85	2.9	1.88	3.2
26	1.85	2.9	1.88	3.2
27	1.88	3.2	1.95	3.9
28	1.91	3.4	2.00	4.8
29	1.90	3.3	2.00	4.8
30	1.90	3.3	1.97	4.2
31	.....	.....	1.95	3.9

a — Gauge height interpolated.

Monthly Discharge of Nanton Creek near Nanton, for 1913.

(Drainage area 46 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
September (8-30)	3.9	2.6	3.23	0.070	0.06	147
October	4.8	3.2	4.12	0.090	0.10	253
The period					0.16	400

Miscellaneous Discharge Measurements made in Little Bow River drainage basin in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
April 29	F.R.Steinberger	Spring	N.E. 10-17-1-5			*a*	0.276
May 20	do	do	do			*a*	0.2751
June 10	do	do	do			*a*	0.561
July 1	do	do	do			*a*	0.0566
" 19	do	do	do			*a*	0.1616
Aug. 11	do	do	do			*a*	0.149
Aug. 30	do	do	do			*a*	0.309
Oct. 8	do	do	do			*a*	0.25

OLDMAN RIVER DRAINAGE BASIN.

General Description.

Oldman River, one of the principal tributaries of the South Saskatchewan River, is formed in the Livingstone range of the Rocky Mountains by the junction of four small rivers, viz.-Livingstone, Northwest Branch, West Branch and Racehorse Creek; it flows in a south and easterly derection to near Cowley, where it is joined by the Crowsnest and South-fork Rivers. Between Cowley and Kipp, where it empties into the Belly River, the Oldman River is augmented by several creeks, its course being easterly and northerly. It drains the area bounded on the north by the parallel of latitude through 59° 20′, on the south by the parallel through 49° 20′, and on the west by the Great Divide, this area being estimated to contain about 2,235 square miles, with topography varying from mountains to rolling prairie.

The bed of the river is of rock and gravel and has a large fall, with consequent swift water interspersed with falls and rapids, but it changes to quick sand and mud after reaching the prairie region where the current is more sluggish.

The flow of this river, draining as it does mountain ranges with peaks extending above the snow line, is subject to great changes, caused by melting snow and heavy summer rains in the mountains. Floods occur regularly in both May and June, the one in June generally rising higher and lasting longer. From this time on, however, the flow is normally steady but gradually decreases until the minimum is reached during January and February.

Up to the present, however, no power has been developed on this river, but investigations with that end in view are being made.

TROUT CREEK AT LOCKWOOD'S RANCHE.

This station was established on July 7, 1911, by A. W. P. Lowrie. It is located on the S.E. ¼ Sec. 33, Tp. 11, Rge. 28, W. 4th Mer., and is about 180 feet from Mr. Lockwood's house.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to the stump of a tree on the right bank. The zero (elev. 92.19) is referred to a permanent iron bench mark (assumed elev. 100.00), located 75 feet downstream from the gauge.

The channel is straight for eighty feet above and seventy feet below the gauge. The right bank is wooded and may overflow during high water. The left bank is wooded and low. The bed of the channel is stony, and not liable to shift.

Discharge measurements are made by wading, twenty feet upstream from the gauge. The initial point for soundings is a post on the left bank.

During 1913, the gauge was read by F. N. Lockwood.

DISCHARGE MEASUREMENTS of Trout Creek at Lockwood's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 16	H. O. Brown	39.0	58.2	1.49	4.04	87.0
May. 7	J. S. Wright	38.5	47.3	1.30	3.79	61.0
May 29	R. Palmer	45.0	68.7	1.53	4.61	105.0
June 18	do	32.0	32.3	1.90	3.74	61.0
July 11	do	35.5	50.6	2.23	4.48	113.0
July 30	do	31.0	31.9	1.60	3.64	52.0
Aug. 21	do	27.5	20.0	1.52	3.31	30.0
Sep. 9	do	26.5	18.0	1.19	3.07	21.0
Sep. 22	do	27.0	18.2	1.16	3.19	21.0
Oct. 11	do	27.0	18.2	0.95	3.14	17.3
Nov. 12	do	26.0	15.3	0.85	3.03	13.0

DAILY GAUGE HEIGHT AND DISCHARGE of Trout Creek at Lockwoods' Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	3.80	64	4.20	93
2	5.67	.....	d 3.86	68	4.13	88
3	5.57	.....	3.86	68	4.10	86
4	5.43	.....	3.69	56	4.07	83
5	5.91	.....	3.71	57	4.03	80
6	5.99	.....	3.71	57	4.03	80
7	5.80	.....	3.76	61	4.03	80
8	5.53	.....	3.86	68	3.95	74
9	5.45	.....	3.89	70	3.92	72
10	5.41	.....	3.91	71	3.91	71
11	5.27	.....	3.91	71	4.92	151
12	5.14	.....	d 3.95	74	3.99	77
13	4.39	108	4.37	106	3.89	70
14	4.04	81	4.63	127	3.86	68
15	3.91	71	4.75	137	3.83	66
16	3.92	72	4.79	140	3.77	61
17	4.13	88	4.74	136	3.76	61
18	4.07	83	4.70	133	3.71	57
19	4.09	85	4.65	128	3.79	63
20	4.11	86	4.65	128	3.99	77
21	4.17	91	4.61	125	3.73	58
22	4.11	86	4.56	121	3.67	54
23	3.97	76	4.50	116	3.65	53
24	3.91	71	4.44	112	3.79	63
25	3.89	70	4.41	109	3.86	68
26	3.89	70	4.39	108	4.43	111
27	3.86	68	4.34	104	4.83	143
28	3.85	67	4.31	102	4.31	102
29	3.85	67	4.31	102	4.66	129
30	3.81	64	4.23	95	4.69	132
31	.....	.....	4.20	93	.....	.....

d Ice conditions previous to April 13; not sufficient data to compute discharge.

Daily Gauge Height and Discharge of Trout Creek at Lockwood's Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.73	135	3.58	48	3.40	36.0	3.06	14.4
2	4.48	115	3.53	45	3.25	26.0	3.06	14.4
3	4.42	110	3.49	42	3.21	23.0	3.07	14.9
4	4.41	110	3.45	39	3.14	18.7	3.23	24.0
5	4.31	102	3.47	40	3.09	15.8	3.21	23.0
6	4.29	100	3.43	38	3.09	15.8	3.17	21.0
7	4.29	100	3.40	36	3.11	16.8	3.21	23.0
8	4.31	102	3.54	45	3.09	15.8	3.19	22.0
9	4.18	92	4.02	79	3.07	14.9	3.22	24.0
10	4.15	89	3.71	57	3.07	14.9	3.19	22.0
11	4.33	103	3.51	43	3.07	14.9	3.14	18.7
12	4.29	100	3.45	39	3.09	15.8	3.16	20.0
13	4.23	95	3.45	39	3.10	16.2	3.15	19.4
14	4.08	84	3.49	42	3.11	16.8	3.15	19.4
15	3.98	76	3.41	36	3.11	16.8	3.15	19.4
16	3.99	77	3.34	32	3.11	16.8	2.87	9.0
17	3.97	76	3.38	34	3.11	16.8	2.90	9.4
18	3.90	71	3.44	38	3.17	21.0	3.01	12.2
19	3.89	70	3.34	32	3.17	21.0	3.10	16.2
20	3.88	69	3.31	30	3.11	16.8	3.13	18.2
21	3.85	67	3.29	28	3.10	16.2	3.11	16.8
22	3.85	67	3.25	26	3.19	22.0	3.09	15.8
23	3.82	65	3.21	23	3.17	21.0	3.07	14.9
24	3.78	62	3.21	23	3.15	19.4	3.07	14.9
25	3.74	59	3.21	23	3.13	18.2	3.07	14.9
26	3.77	61	3.19	22	3.12	17.5	3.06	14.4
27	3.73	58	3.19	22	3.08	15.3	3.05	14.0
28	3.75	60	3.17	21	3.07	14.9	3.07	14.9
29	3.79	63	3.17	21	3.07	14.9	3.19	22.0
30	3.69	56	3.17	21	3.07	14.9	3.04	13.5
31	3.64	52	3.32	30	.....	.....	3.09	15.8

Monthly Discharge of Trout Creek at Lockwood's Ranche, for 1913.

(Drainage area 164 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (13-30)	108.0	64.0	78.0	0.476	0.32	2,785
May	140.0	56.0	97.0	0.591	0.68	5,964
June	151.0	53.0	82.4	0.502	0.56	4,903
July	135.0	52.0	82.1	0.501	0.58	5,048
August	79.0	21.0	35.3	0.215	0.25	2,170
September	36.0	14.9	10.2	0.111	0.12	1,083
October	24.0	9.0	17.3	0.105	0.12	1,064
The period	.....	.....	.....	.....	2.63	23,017

MUDDYPOUND CREEK AT HART'S RANCHE.

This station was established July 27, 1908, by H. C. Ritchie. It is located at the foot bridge on L. O. Hart's ranche on the S.W. ¼ Sec. 27, Tp. 11, Rge. 28, W. 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is placed at the left bank, 15 feet upstream from the bridge. The zero (elev. 90.06) is referred to a permanent iron bench mark (assumed elev. 100.00) 35 feet northeast of the gauge.

The channel is straight for 30 feet above and 110 feet below the station. Both banks are high, composed of clay, but liable to overflow in extreme floods. The bed is of clean gravel. The current is fairly swift.

Discharge measurements are made from the bridge in high water, the initial point for soundings being marked at the left end of the bridge. In low stages the creek is waded about 100 feet upstream.

During 1913, the gauge was read by Mrs. M. E. Hart.

DISCHARGE MEASUREMENTS of Muddypound Creek at Hart's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 15	H. O. Brown	13.5	12.30	1.05	2.44	12.90
May 7	J. S. Wright	11.0	8.34	0.88	2.30	7 40
May 29	R. Palmer	13.0	10.70	0.83	2.45	8 80
June 18	do	12.0	8.60	0.51	2.20	4 40
July 11	do	12.5	10.50	0.79	2.40	8.32
July 30	do	11.5	8.17	0.48	2.22	3 90
Aug. 21	do	12.5	7.10	0.21	2.10	1 48
Sep. 9	do	12.5	6.52	0.08	2.07	0.54
Sep. 22	do	11.6	7.56	0.20	2 15	1 49
Oct. 11	do	12.0	7.72	0.25	2 15	1.95
Nov. 12	do	12.0	7.20	0.23	2 13	1 66

DAILY GAUGE HEIGHT AND DISCHARGE of Muddypound Creek at Hart's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.31	6 3	2.33	6.9
2			2.30	6.0	2.32	6 6
3			2.30	6.0	2.31	6.3
4	3.80	*a*	2.30	6.0	2.30	6 0
5	3.05		2.30	6.0	2.30	6.0
6	3.03		2.30	6.0	2.29	5.7
7	2.91		2.30	6.0	2.29	5.7
8	2.90		2.30	6.0	2.29	5.7
9	2.84		2.30	6.0	2.29	5.7
10	2.81		2.30	6.0	2.30	6.0
11	2.80		2.30	6.0	2.30	6.0
12	2.74	*a*	2.30	6.0	2.28	5 4
13	2.65	17.3	2.30	6.0	2.26	4 9
14	2.60	15.6	2.35	7.5	2.25	4 6
15	2.58	14.9	2.35	7.5	2.24	4 3
16	2.56	14 2	2.34	7.2	2.24	4 3
17	2.55	13 9	2.33	6.9	2.33	6 9
18	2.54	13 6	2.32	6.6	2.40	9.0
19	2.54	13.6	2 31	6.3	2.40	9 0
20	2.53	13 2	2.31	6.3	2.38	8 1
21	2.53	13.2	2.30	6.0	2.37	8.1
22	2.45	10.6	2.30	6 0	2.37	8.1
23	2.45	10 6	2.30	6.0	2.38	8.1
24	2.40	9 0	2 29	5 7	2.40	9 0
25	2.33	6 9	2 29	5 7	2.90	26 0
26	2.28	5 4	2 29	5 7	2.60	15 6
27	2 27	5 2	2 29	5 7	2.60	15 6
28	2 26	4.9	2 30	6 0	2.70	19.0
29	2.24	4 3	2.40	9.0	2 60	15 6
30	2.23	4 1	2 38	8 4	2.50	12 2
31			2 35	7 5		

a Ice conditions previous to April 13; not sufficient data to compute discharge.

Daily Gauge Height and Discharge of Muddypound Creek at Hart's Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.45	10.60	2.10	1.10	2.20	3.30	2.08	0.86
2	2.40	9.00	2.10	1.10	2.25	4.60	2.07	0.74
3	2.38	8.40	2.10	1.10	2.23	4.10	2.06	0.62
4	2.35	7.50	2.10	1.10	2.10	1.10	2.12	1.50
5	2.52	12.90	2.10	1.10	2.15	2.10	2.14	1.90
6	2.20	3.30	2.10	1.10	2.10	1.10	2.15	2.10
7	2.30	6.00	2.15	2.10	2.10	1.10	2.15	2.10
8	2.30	6.00	2.35	7.50	2.09	0.98	2.15	2.10
9	2.30	6.00	2.40	9.00	2.07	0.74	2.15	2.10
10	2.40	9.00	2.30	6.00	2.06	0.62	2.15	2.10
11	2.34	7.20	2.20	3.30	2.05	0.50	2.15	2.10
12	2.30	6.00	2.20	3.30	2.04	0.46	2.15	2.10
13	2.28	5.40	2.20	3.30	2.04	0.46	2.15	2.10
14	2.25	4.60	2.17	2.15	2.05	0.50	2.14	1.90
15	2.24	4.30	2.17	2.15	2.05	0.50	2.14	1.90
16	2.22	3.80	2.15	2.10	2.05	0.50	2.13	1.70
17	2.20	3.30	2.15	2.10	2.05	0.50	2.13	1.70
18	2.20	3.30	2.15	2.10	2.05	0.50	2.13	1.70
19	2.00	0.30	2.15	2.10	2.05	0.50	2.13	1.70
20	2.00	0.30	2.14	1.90	2.06	0.62	2.13	1.70
21	2.00	0.30	2.13	1.70	2.09	0.98	2.13	1.70
22	2.00	0.30	2.12	1.50	2.15	2.10	2.13	1.70
23	2.00	0.30	2.10	1.10	2.13	1.70	2.13	1.70
24	2.00	0.30	2.10	1.10	2.12	1.50	2.13	1.70
25	2.00	0.30	2.10	1.10	2.11	1.30	2.14	1.90
26	2.00	0.30	2.10	1.10	2.10	1.10	2.14	1.90
27	2.00	0.30	2.10	1.10	2.10	1.10	2.14	1.90
28	2.20	3.30	2.10	1.10	2.10	1.10	2.14	1.90
29	2.30	6.00	2.10	1.10	2.09	0.98	2.14	1.90
30	2.20	3.30	2.15	2.10	2.09	0.98	2.15	2.10
31	2.25	4.60	2.30	6.00	.....	.....	2.15	2.10

Monthly Discharge of Muddypound Creek at Hart's Ranche, for 1913.

(Drainage area 43 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	17.3	4.10	10.60	0.246	0.16	378
May	9.0	5.70	6.40	0.149	0.17	394
June	26.0	4.30	8.70	0.202	0.22	518
July	12.9	0.30	4.40	0.102	0.12	270
August	9.0	1.10	2.41	0.056	0.06	148
September	4.6	0.46	1.25	0.029	0.03	74
October	2.1	0.62	1.78	0.041	0.05	109
The period					0.81	1,891

WILLOW CREEK NEAR MACLEOD.

This station was established July 1, 1909, by H. C. Ritchie. It is located at the traffic bridge on the S.E. ¼ Sec. 26, Tp. 9, Rge. 26, W. 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is located about 300 yards upstream from the bridge and near Mr. McLean's stable. It is driven into the bed of the creek and fixed to the bank with braces. The zero of the gauge (elev. 90.84) is referred to a permanent iron bench mark (assumed elev. 100.00), located 39 feet northeast of the gauge and 160 feet southwest from the corner of Mr. McLean's stable.

The channel is straight for about 600 feet above and below the station. The right bank is high and wooded. The left bank is low, wooded, and liable to overflow in high water stages. The bed of the stream is of clean gravel. The slope is uniform and the current swift.

Discharge measurements are made from the bridge during high stages, the initial point for soundings being marked on the downstream handrail on a line with the face of the north abutment. During low stages the river is waded at the same section, and when very low it is waded at the gauge.

During 1913, the gauge was read by Hugh McLean.

Discharge Measurements of Willow Creek near Macleod, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 18	H. O. Brown	98.6	217.0	2.42	3.77	524
May 9	J. S. Wright	98.5	165.0	1.76	3.07	290
May 23	R. Palmer	99.0	225.0	2.13	3.65	479
June 16	do	81.0	138.2	1.61	2.90	223
July 5	do	99.0	198.7	2.33	3.66	462
Aug. 2	do	71.0	115.0	1.45	2.64	167
Aug. 23	do	70.0	106.0	1.40	2.55	149
Sep. 11	do	56.0	88.2	0.97	2.10	86
Sep. 24	do	57.0	90.9	1.09	2.20	99
Oct. 14	do	56.0	89.8	0.97	2.10	87
Oct. 25	do	57.0	88.3	1.05	2.15	93

Daily Gauge Height and Discharge of Willow Creek near Macleod, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	2.85	212	3.50	415
2	.....	.....	2.81	202	3.42	386
3	.....	.....	2.92	228	3.35	362
4	.....	.....	2.86	214	3.35	362
5	.....	.....	2.85	212	3.32	351
6	.....	.....	2.87	216	3.26	331
7	a 4.25	692	2.92	228	3.20	311
8	4.25	692	3.05	264	3.15	295
9	4.30	711	3.10	279	3.12	285
10	4.35	729	3.15	295	3.10	279
11	4.40	748	3.22	318	3.16	298
12	4.42	755	3.36	365	3.27	334
13	4.40	748	3.43	390	3.18	305
14	4.12	644	3.84	541	2.95	236
15	3.80	526	3.90	563	2.92	228
16	3.80	526	3.80	526	2.85	212
17	3.80	526	3.73	500	2.76	192
18	3.70	489	3.82	533	2.72	183
19	3.68	482	3.87	552	2.75	189
20	3.63	463	3.74	504	2.85	212
21	3.52	422	3.68	482	2.82	205
22	3.50	415	3.61	456	2.82	205
23	3.35	362	3.65	470	2.85	212
24	3.22	318	3.65	470	2.85	212
25	3.13	289	3.65	470	2.85	212
26	3.07	270	3.65	470	3.15	295
27	3.00	249	3.65	470	3.80	526
28	2.98	244	3.65	470	4.10	637
29	2.95	236	3.65	470	4.10	637
30	2.90	223	3.67	478	4.05	618
31	.....	.....	3.62	459	.....	.....

a Observations commenced.

Daily Gauge Height and Discharge of Willow Creek near Macleod, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.10	637	2.68	175	2.36	120	2.03	78
2	4.12	644	2.64	168	2.45	134	2.03	78
3	3.50	415	2.64	168	2.50	142	2.03	78
4	3.65	470	2.60	160	2.43	131	2.05	80
5	3.65	470	2.55	151	2.35	119	2.07	82
6	3.55	433	2.51	144	2.20	79	2.08	84
7	3.47	404	2.50	142	2.16	94	2.09	85
8	3.35	362	2.50	142	2.15	92	2.10	86
9	3 26	331	2.65	170	2.13	90	2.09	85
10	3.20	311	2.80	200	2.10	86	2.10	86
11	3.16	298	3.50	415	2.08	84	2.10	86
12	3.12	285	3.52	422	2.05	80	2.10	86
13	3.09	276	3.25	327	2.05	80	2.10	85
14	3.06	267	3.08	373	2.03	78	2.10	86
15	3.03	258	3.05	264	2.00	74	2.10	86
16	3.00	249	2.98	244	1.97	71	2.10	86
17	2.98	244	2.80	200	1.90	64	2.12	89
18	2.95	236	2.78	196	1.87	62	2.12	89
19	2.95	236	2.75	189	1.96	70	2.10	86
20	2.93	231	2.70	179	2.05	80	2.10	86
21	2.90	223	2.60	160	2.10	86	2.10	86
22	2.87	216	2.60	160	2.25	105	2.12	89
23	2.85	212	2.46	136	2.23	103	2.12	89
24	2.85	212	2.40	126	2.20	99	2.15	92
25	2.85	212	2.36	120	2.20	99	2.15	92
26	2.80	200	2.30	112	2.16	94	2.15	92
27	2.80	200	2.28	109	2.11	87	2.15	92
28	2.75	189	2.28	109	2.05	80	2.12	89
29	2.75	189	2.26	107	2.05	80	2.08	84
30	2.75	189	2.25	105	2.04	79	2.05	80
31	2.75	189	2.30	112			2.02	76

Monthly Discharge of Willow Creek near Macleod, for 1913.

(Drainage area 1,016 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (7-31)	755	223	490	0.482	0.43	23,325
May	563	202	397	0.391	0.45	24,411
June	637	183	317	0.312	0.35	18,863
July	644	189	300	0.295	0.34	18,446
August	422	105	187	0.184	0.21	11,498
September	142	62	92	0.091	0.10	5,474
October	92	76	85	0.084	0.10	5,226
The period					1.98	107,243

OLDMAN RIVER NEAR MACLEOD.

This station was established on July 12, 1910, by H. C. Ritchie. It is located at the traffic bridge on the N.W. ¼ Sec. 10, Tp. 9, Rge. 26, W. 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to a crib protecting the pier near the right bank. The zero of the gauge (elev. 91.84) is referred to a bench mark on spikes in a wooden bent (assumed elv. 100.00) located 93 feet east of the gauge.

The channel is straight for 400 feet above and 1,000 feet below the station. Both banks are low, wooded and liable to overflow in extreme high water. The bed is composed of clean gravel, and shifts during high water stages. The current is swift, especially during high water.

Discharge measurements are made from the bridge, the initial point for soundings being at the north end of the handrail on the downstream side of the bridge.

During 1913 the gauge was read by Mrs. Walter Jackson.

DISCHARGE MEASUREMENTS of Oldman River near Macleod, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 2	H. O. Brown	82.7	285.9	1 11	3 20	316
Jan. 22	do	86.2	252.0	1 15	4 00	289
Feb. 8	do	85.9	224	1 22	3 43	272
Feb. 22	do	90.4	253	1 05	3.78	267
Mar. 11	do	113	290	1 77	4 40	515
April 3	do	d 130	318	1 38	4 33	540
April 17	do	120	597	5 99	5 36	3,575
May 8	J .S. Wright	111	420	4 11	4 51	1,827
May 26	R. Palmer	404	1988	6 25	8 12	12,418
June 16	do	275	1013	4 13	6 00	4,190
July 5	G. H. Whyte	118	526	4.79	5 15	2,521
Aug. 1	R. Palmer	102	371	3 04	3.80	1,130
Aug. 22	do	102	364	2 93	3 57	1,066
Sept. 10	do	99	349	2 29	3 21	801
Sept. 25	do	96	316	2 00	2 90	632
Oct. 14	do	96	299	1 93	2 85	578
Oct. 25	do	99	324	2.50	3.25	812
Nov. 20	do	94	288	1 78	2.78	511
Dec. 9	do	92	283	2 00	2 65	565
Dec. 27	do	95	250	1.26	2 70	315

d Different section.

Daily Gauge Height and Discharge of Oldman River near Macleod, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.25	*a*310	3.90	318	2.89	241	4.15	503	4.90	2,640	8.20	12,760
2	3.20	317	3.85	312	3.70	310	4.32	526	4.80	2,470	8.10	12,305
3	3.15	320	3.83	302	3.65	420	4.35	540	4.65	2,235	7.90	11,395
4	3.30	320	3.80	278	4.35	470	4.33	550	4.55	2,090	7.65	10,255
5	3.60	317	3.70	252	4.37	500	4.25	556	4.50	2,020	7.50	9,575
6	4.00	313	3.45	236	4.35	517	4.20	565	4.40	1,890	7.40	9,120
7	4.10	311	3.25	255	4.32	530	4.20	*b*1,650	4.35	1,830	7.20	8,210
8	4.25	310	3.45	272	4.40	538	4.00	1,430	4.51	2,034	7.15	7,990
9	4.50	308	3.99	282	4.60	542	3.90	1,330	4.53	2,062	7.20	8,210
10	5.00	305	3.80	292	4.70	536	3.90	1,330	4.60	2,160	7.20	8,210
11	5.10	302	3.60	303	4.40	515	4.25	1,710	4.75	2,390	7.10	7,770
12	5.00	300	3.40	314	4.20	482	4.50	2,020	4.95	2,725	7.00	7,340
13	5.00	298	4.25	326	4.10	432	4.60	2,160	5.15	3,080	6.95	7,130
14	4.95	295	4.60	332	3.60	390	4.72	2,342	5.40	3,580	6.60	5,860
15	4.89	295	4.70	335	3.00	334	5.00	2,810	5.40	3,580	6.40	5,220
16	4.70	293	4.60	332	3.40	300	5.20	3,180	5.40	3,580	6.00	4,150
17	4.55	292	4.50	328	3.30	270	5.40	3,580	5.40	3,580	5.70	3,480
18	4.40	290	4.10	322	3.20	258	5.70	4,210	5.42	3,622	5.55	3,185
19	4.30	290	3.30	312	3.00	247	5.50	3,790	5.42	3,622	5.40	2,920
20	4.25	288	3.90	296	2.80	247	6.00	4,920	5.43	3,643	6.00	4,150
21	4.17	288	3.85	284	2.90	250	6.50	6,350	5.43	3,643	5.95	4,035
22	4.00	289	3.90	267	3.00	257	6.15	5,315	5.90	4,670	5.70	3,480
23	4.00	293	3.75	248	3.00	270	5.70	4,210	6.38	5,980	5.40	2,920
24	4.00	302	5.60	235	3.00	282	5.40	3,580	6.70	7,020	5.35	2,840
25	3.98	312	3.45	228	3.20	302	5.20	3,180	7.25	9,070	5.26	2,700
26	3.98	318	3.20	225	3.10	330	5.00	2,810	7.69	10,756	5.40	2,920
27	3.99	321	3.00	226	3.40	360	5.30	3,380	8.17	12,637	5.80	3,690
28	4.00	323	3.10	230	3.70	390	5.50	3,790	8.34	13,395	6.20	4,650
29	4.00	322	.....	.....	4.00	430	5.20	3,180	8.39	13,624	6.00	4,150
30	3.98	321	.....	.....	4.10	470	5.00	2,810	8.35	13,440	5.90	3,920
31	3.95	321	.....	.....	4.12	487	.....	.....	8.20	12,760	.....	.....

a–b Ice conditions.

Daily Gauge Height and Discharge of Oldman River near Macleod, for 1913. (*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.70	3,480	3.80	1,220	3.30	860	2.90	630	3.10	740	2.60	510
2	5.58	3,242	3.80	1,220	3.32	874	2.87	618	3.07	722	2.55	490
3	5.40	2,920	3.70	1,140	3.25	830	2.85	610	3.07	722	2.50	470
4	5.25	2,685	3.65	1,105	3.20	800	3.83	602	3.07	722	2.50	470
5	5.15	2,535	3.60	1,070	3.30	860	2.82	598	3.07	722	2.45	450
6	5.00	2,320	3.55	1,035	3.40	930	2.80	590	3.07	722	2.60	510
7	4.90	2,200	3.50	1,000	3.40	930	2.80	590	3.07	722	2.55	490
8	4.82	2,104	3.45	965	3.35	895	2.80	590	3.07	722	2.55	490
9	4.75	2,030	3.75	1,180	3.30	860	2.80	590	3.05	710	2.50	470
10	4.70	1,980	3.90	1,300	3.25	830	2.78	582	3.02	692	2.50	470
11	4.65	1,930	4.30	1,620	3.19	794	2.75	570	3.00	680	2.55	490
12	4.60	1,880	4.30	1,620	3.17	782	2.70	550	3.00	680	2.60	510
13	4.60	1,880	4.20	1,540	3.15	770	2.65	530	3.00	680	2.57	498
14	4.55	1,835	4.15	1,500	3.12	752	2.60	510	2.97	665	2.54	486
15	4.45	1,745	4.10	1,460	3.09	734	3.65	1,105	2.93	645	2.50	470
16	4.32	1,636	4.05	1,420	3.07	722	3.75	1,180	2.98	670	2.50	470
17	4.15	1,500	4.00	1,380	3.05	710	3.70	1,140	3.02	692	2.49	466
18	4.05	1,420	3.95	1,340	3.04	704	3.60	1,070	3.05	710	2.47	458
19	4.00	1,380	3.90	1,300	3.04	704	3.53	1,021	3.00	680	2.40	430
20	3.90	1,300	3.80	1,220	3.04	704	3.49	993	3.00	680	2.25	370
21	3.90	1,300	3.75	1,180	3.04	704	3.45	965	2.85	610	2.10	310
22	3.90	1,300	3.67	1,119	3.04	704	3.40	930	2.70	550	2.00	280
23	3.90	1,300	3.60	1,070	3.04	704	3.35	895	2.50	470	2.00	280
24	3.85	1,260	3.55	1,035	3.00	680	3.20	800	2.80	590	2.00	280
25	3.85	1,260	3.40	930	3.00	680	3.20	800	3.00	680	2.20	*c*290
26	3.85	1,260	3.35	895	3.00	680	3.20	800	3.00	680	2.35	306
27	3.80	1,220	3.25	830	3.00	680	3.20	800	3.00	680	2.75	315
28	3.75	1,180	3.23	818	3.00	680	3.25	830	2.90	630	2.85	318
29	3.85	1,260	3.21	806	2.97	665	3.30	860	2.78	582	3.00	317
30	4.05	1,420	3.19	794	2.95	655	3.25	830	2.70	550	3.00	310
31	4.00	1,380	3.19	794	.....	.....	3.20	800	.....	.....	3.00	*d*300

c–d Ice conditions.

Monthly Discharge of Oldman River near Macleod, for 1913.

(Drainage area 2,235 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	323	288	306	0.137	0.158	18,815
February	335	225	284	0.127	0.132	15,773
March	542	241	384	0.172	0.198	23,611
April	6,350	503	2,610	1.160	1.290	155,305
May	13,624	1,830	5,220	2.340	2.700	320,976
June	12,760	2,700	6,151	2.750	3.070	366,010
July	3,480	1,180	1,811	0.810	0.934	111,354
August	1,620	794	1,158	0.518	0.598	71,141
September	930	655	765	0.341	0.380	45,402
October	1,180	510	774	0.346	0.399	47,591
November	740	470	667	0.298	0.332	39,689
December	510	280	412	0.184	0.212	25,333
The year	.....	.....	.....	.....	10.403	1,241,000

PINCHER CREEK AT PINCHER CREEK.

Under the direction of Arthur O. Wheeler, a regular gauging station was established on Pincher Creek at Pincher Creek, in the spring of 1898. On August 13, 1906, J. F. Hamilton replaced the old gauge by a new one. Owing to local improvements the gauge has since been changed but the station remains practically in the same place as established by Mr. Wheeler. It is located on the S.W. ¼ Sec. 23, Tp. 6, Rge. 30, W. 4th Mer., at the steel traffic bridge in the town of Pincher Creek.

The gauge, which is a plain staff graduated to feet and hundredths is securely fastened to the breakwater on the right bank, about twenty feet below the traffic bridge. The zero of the gauge (elev. 86.35) is referred to a bench mark (assumed elevation 100.00) located on the right concrete abutment of the bridge.

The channel is straight for about 200 yards above and 300 yards below the bridge. Both banks are high, the right being well cribbed; neither is liable to overflow. The bed is rock and free from vegetation. At the wading section, the channel is straight for about 500 yards above and 70 yards below. Both banks are high, clean and not liable to overflow. The bed is gravel, mixed with heavy gumbo clay.

During high water, discharge measurements are made from the downstream side of the bridge. At low stages, the creek is waded 450 yards upstream.

During 1913 the gauge was read by Hugh Bertles.

The town of Pincher Creek has a gravity waterworks system, which diverts water from the creek at a point about three and one quarter miles above the bridge, and the records at this station do not include the water used by the town.

DISCHARGE MEASUREMENTS of Pincher Creek at Pincher Creek, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 26	H. O. Brown	49.4	42.2	2.26	2.85	96.0
May 16	R. Palmer	52.0	49.9	2.65	2.93	132.0
June 7	do	52.0	54.5	2.73	3.01	149.0
June 25	do		35.3	1.73	2.68	61.0
July 14	do	38.5	23.9	1.55	2.42	37.0
Aug. 4	do	32.5	16.6	1.05	2.19	17.4
Aug. 25	do	33.0	16.0	0.99	2.19	15.9
Sept. 18	do	31.0	15.8	0.91	2.09	14.4
Sept. 26	do	29.0	14.3	0.94	2.11	13.4
Oct. 16	do	46.0	38.0	1.67	2.69	63.0
Nov. 11	do	32.0	19 0	1.11	2.26	21.0

Daily Gauge Height and Discharge of Pincher Creek at Pincher Creek, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.80	85	3.10	191
2			2.79	83	3.12	199
3			2.79	83	3.11	195
4			2.70	65	3.06	175
5			2.70	65	3.06	175
6	3.06	175	2.70	65	3.02	159
7	3.01	155	2.72	69	2.96	136
8	2.95	132	2.85	98	2.96	136
9	2.75	74	2.85	98	2.96	136
10	2.85	98	2.82	90	2.95	132
11	3.07	179	2.89	111	2.94	128
12	3.02	159	2.90	114	2.94	128
13	3.05	171	2.90	114	2.92	121
14	3.07	179	2.90	114	2.86	101
15	3.00	151	2.90	114	2.84	95
16	3.32	279	3.05	171	2.74	72
17	3.00	151	3.01	155	2.70	65
18	3.00	151	3.08	183	2.70	65
19	3.17	219	3.08	183	2.86	101
20	3.18	223	3.02	159	2.88	108
21	3.09	187	3.01	155	2.70	65
22	3.02	159	3.08	183	2.74	72
23	2.98	143	3.11	195	2.72	69
24	2.88	108	3.09	187	2.69	63
25	2.82	90	3.08	183	2.70	65
26	2.84	95	3.08	183	3.00	151
27	2.85	98	3.08	183	3.20	231
28	2.84	95	3.30	271	3.20	231
29	2.80	85	3.20	231	3.05	171
30	2.80	85	3.12	199	2.90	114
31			3.10	191		

Daily Gauge Height and Discharge of Pincher Creek at Pincher Creek, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.90	114	2.49	38.0	2.20	18.0	2.11	13.4
2	2.85	98	2.51	40.0	2.19	17.4	2.11	13.4
3	2.80	85	2.49	38.0	2.14	14.6	2.11	13.4
4	2.70	65	2.19	17.4	2.16	15.6	2.19	17.4
5	2.70	65	2.19	17.4	2.10	13.0	2.19	17.4
6	2.69	63	2.19	17.4	2.09	12.6	2.19	17.4
7	2.64	56	2.19	17.4	2.09	12.6	2.19	17.4
8	2.59	49	2.39	30.0	2.09	12.6	2.17	16.2
9	2.54	43	2.69	63.0	2.08	12.2	2.19	17.4
10	2.49	38	2.69	63.0	2.09	12.6	2.19	17.4
11	2.49	38	2.59	49.0	2.09	12.6	2.19	17.4
12	2.49	38	2.54	43.0	2.09	12.6	2.62	53.0
13	2.44	34	2.49	38.0	2.09	12.6	2.74	72.0
14	2.42	33	2.44	34.0	2.08	12.2	2.69	63.0
15	2.39	30	2.39	30.0	2.08	12.2	2.54	43.0
16	2.37	29	2.34	26.0	2.06	11.4	2.46	36.0
17	2.32	25	2.37	29.0	2.06	11.4	2.40	31.0
18	2.29	23	2.37	29.0	2.04	10.6	2.39	30.0
19	2.39	30	2.34	26.0	2.09	12.6	2.39	30.0
20	2.39	30	2.31	25.0	2.08	12.2	2.39	30.0
21	2.37	29	2.27	22.0	2.08	12.2	2.39	30.0
22	2.39	30	2.24	20.0	2.10	13.0	2.37	29.0
23	2.42	33	2.19	17.4	2.19	17.4	2.36	28.0
24	2.44	34	2.19	17.4	2.18	16.8	2.34	26.0
25	2.47	37	2.19	17.4	2.16	15.6	2.33	26.0
26	2.47	37	2.17	16.2	2.11	13.4	2.33	26.0
27	2.49	38	2.15	15.0	2.10	13.0	2.32	25.0
28	2.47	37	2.14	14.6	2.10	13.0	2.29	23.0
29	2.49	38	2.13	14.2	2.11	13.4	2.32	25.0
30	2.51	40	2.13	14.2	2.12	13.8	2.29	23.0
31	2.49	38	2.19	17.4	.....	.....	2.27	22.0

Monthly Discharge of Pincher Creek at Pincher Creek, for 1913.

(Drainage area 53 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April 6 to 30)	279.0	74.0	146.0	2.750	2.56	7,240
May	271.0	65.0	141.0	2.700	3.11	8,670
June	231.0	63.0	128.0	2.420	2.70	7,617
July	114.0	23.0	44.4	0.838	0.97	2,730
August	63.0	14.2	27.6	0.521	0.60	16,97
September	18.0	10.6	13.4	0.253	0.28	797
October	72.0	13.4	27.4	0.517	0.60	1,685
The period	.....	.....	.....	.....	10.82	30,436

SOUTHFORK RIVER NEAR COWLEY.

This station was established on August 5, 1909, by H. C. Ritchie. It is located at G. W. Buchanan's ranche on the S.W. ¼ Sec. 2, Tp. 7, Rge. 1, W. 5th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is securely fastened by braces to supports on the right bank, and is about five minutes' walk from Mr. Buchanan's house. The zero of the gauge (elev. 92.34) is referred to a permanent iron bench mark (assumed elevation 100.00), located on the left bank of the river, 25 feet southwest from the gauge.

The river flows in one channel, which is slightly curved for some distances above and below the gauge. The left bank is high and will not overflow. The right bank is low and liable to be submerged during flood stages of the stream. The bed is composed of coarse gravel. The current is moderate.

Discharge measurements are made from the downstream side of the traffic bridge on the S.E. ¼ Sec. 2, Tp. 7, Rge. 1, W. 5th Mer. The initial point for soundings is marked on the superstructure in line with the face of the abutment on the left bank.

During 1913 the gauge was read by G. W. Buchanan.

DISCHARGE MEASUREMENTS of Southfork River near Cowley, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec. ft.*
Jan. 8	H. O. Brown	76	215	.64	2.92	135
Feb. 11	do	44	68.2	1.28	3.28	87.
Feb. 27	do	49	75.3	1.01	2.60	76.
Mar. 26	do	50	77.0	1 10	2.90	85.
April 8	do	50	87.0	1.73	2.71	150.
April 26	do	117	328	3 09	3.72	1,015.
June 5	R Palmer	253	626	5.57	5 40	3,489
June 27	do	226	513	4.51	4 65	2,315
July 18	do	111	230	2 47	3.22	567
Aug 14	do	108	250	2.59	3.25	648
Aug 25	do	71	98.4	3.36	2.70	331
Sept 13	do	68	90.5	3 14	2.67	284
Sept 26	do	60	76.9	3 00	2.55	231.
Oct 17	do	102	219.	2.20	3 05	481.
Nov 11	do	98	192.	1 84	2 85	354
Nov 29	do	62	91.6	3.15	2.70	289.
Dec 12	do	84	55.6	2.08	2.85	115

Daily Gauge Height and Discharge of Southfork River near Cowley, for 1913.

Day.	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.90*a*	132	3.52	124	2.80	76	2.83	112	3.62	920	6.27	4,859
2	2.85	133	3.53	123	2.95	76	2.85	118	3.47	779	6.22	4,780
3	2.67	132	3.52	120	2.60	77	2.85	126	3.47	779	6.10	4,592
4	2.78	132	3.50	117	2.32	79	2.88	132	3.52	824	5.90	4,278
5	2.70	132	3.50	114	2.53	85	2.88	137	3.56	862	5.40*c*	3,493
6	2.75	133	3.48	104	2.78	93	2.85	142	3.57	871	5.10	3,022
7	2.93	134	3.40	99	3.05	99	2.78	147	3.52	824	5.10	3,022
8	3.10	135	3.33	94	3.18	101	2.71	150	3.47	779	5.20	3,179
9	3.12	135	3.25	91	3.00	103	2.70	153	3.49	796	5.30	3,336
10	3.13	132	3.20	88	2.82	102	2.70	156	3.52	824	5.35	3,414
11	3.15	128	3.28	87	2.80	101	2.63*b*	158	3.71	1,010	5.40	3,493
12	3.17	124	3.25	88	2.85	99	2.91	400	3.77	1,070	5.30	3,336
13	3.20	118	3.25	90	2.83	92	3.02	462	3.82	1,124	5.10	3,022
14	3.24	110	3.30	93	2.85	88	3.17	555	3.85	1,160	4.80	2,551
15	3.24	101	3.32	97	2.84	84	3.24	603	3.87	1,184	4.70	2,394
16	3.27	99	3.35	103	2.85	83	3.35	683	3.92	1,246	4.40	1,930
17	3.30	97	3.35	106	2.87	82	3.49	796	3.94	1,272	4.35	1,855
18	3.35	97	3.34	108	2.90	80	3.67	970	3.97	1,313	4.35	1,855
19	3.32	96	3.15	108	2.93	79	3.72	1,020	3.99	1,341	4.35	1,855
20	3.30	97	3.02	107	2.95	79	3.75	1,050	4.13	1,537	4.45	2,005
21	3.32	100	2.83	104	3.00	79	3.79	1,090	4.27	1,740	4.20	1,640
22	3.35	104	2.85	100	2.97	80	3.84	1,148	4.37	1,885	4.20	1,640
23	3.37	108	2.90	96	2.90	80	3.87	1,184	4.77	2,503	4.15	1,565
24	3.38	114	2.93	86	2.84	81	3.85	1,160	5.17	3,131	4.15	1,565
25	3.35	118	2.80	82	2.73	83	3.74	1,040	5.32	3,367	4.20	1,640
26	3.39	121	2.68	78	2.65	85	3.67	970	5.47	3,602	4.40	1,930
27	3.45	122	2.60	76	2.68	88	3.67	970	5.77	4,074	4.65	2,315
28	3.50	124	2.67	76	2.70	91	3.65	950	6.27	4,859	4.75	2,472
29	3.60	125	.....	.....	2.75	96	3.65	950	6.37*c*	5,016	4.65	2,315
30	3.63	126	.....	.....	2.78	101	3.62	920	6.37	5,016	4.40	1,930
31	3.55	125	.....	.....	2.80	107	.....	.....	6.27	4,859	.....	.....

a–b Ice conditions.
c Rod out May 29—June 5th. Gauge heights estimated by observer.

Daily Gauge Height and Discharge of Southfork River near Cowley, for 1913. (*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.20	1,640	3.00	450	2.70	298	2.55	232	2.85	370	2.80	254
2	4.15	1,565	2.95	422	2.70	298	2.55	232	2.85	370	2.85	240
3	4.00	1,355	2.95	422	2.70	298	2.55	232	2.80	345	2.80	225
4	3.95	1,285	2.90	395	2.65	275	2.55	232	2.80	345	2.80	210
5	3.90	1,220	2.88	385	2.65	275	2.55	232	2.80	345	2.85	192
6	3.80	1,100	2.90	395	2.75	321	2.60	252	2.75	321	2.85	173
7	3.80	1,100	2.95	422	2.75	321	2.65	275	2.75	321	2.85	162
8	3.75	1,050	2.95	422	2.70	298	2.68	289	2.75	321	2.83	152
9	3.60	900	3.40	720	2.70	298	2.70	298	2.75	321	2.85	142
10	3.65	950	3.35	683	2.70	298	2.95	422	2.83	360	2.85	133
11	3.55	852	3.20	574	2.65	275	3.00	450	2.85	370	2.85	124
12	3.50	805	3.15	542	2.67	284	3.00	450	2.85	370	2.85	116
13	3.50	805	3.15	542	2.65	275	3.20	574	2.85	370	2.80	110
14	3.40	720	3.10	510	2.65	275	3.25	610	2.85	370	2.83	102
15	3.30	646	3.10	510	2.60	252	3.25	610	2.80	345	2.80	107
16	3.35	683	3.05	480	2.60	252	3.15	542	2.80	345	2.78	115
17	3.25	610	3.00	450	2.60	252	3.05	480	2.80	345	2.75	110
18	3.25	610	3.00	450	2.55	232	3.00	450	2.80	345	2.70	103
19	3.22	588	2.95	422	2.55	232	2.98	439	2.80	345	2.70	110
20	3.20	574	2.90	395	2.55	232	2.95	422	2.80	345	2.70	122
21	3.15	542	2.85	370	2.55	232	2.95	422	2.85	370	2.73	120
22	3.10	510	2.85	370	2.60	252	2.95	422	2.85	370	2.60	105
23	3.10	510	2.85	370	2.60	252	2.95	422	2.85	370	3.15	101
24	3.10	510	2.80	345	2.60	252	2.95	422	2.80	*c*370	2.90	108
25	3.10	510	2.80	345	2.60	252	2.95	422	2.80	362	3.50	105
26	3.10	510	2.75	321	2.55	232	2.95	422	2.75	344	3.58	114
27	3.05	480	2.70	298	2.55	232	2.95	422	2.75	325	3.45	135
28	3.05	480	2.70	298	2.55	232	2.95	422	2.75	310	3.55	140
29	3.00	450	2.70	298	2.55	232	2.90	395	2.85	289	3.45	121
30	3.00	450	2.70	298	2.55	232	2.90	395	2.85	274	3.25	109
31	3.00	450	2.70	298	.....	.....	2.85	370	.....	.....	3.05	*d*109

c–d Ice conditions.

Monthly Discharge of Southfork River near Cowley, for 1913.

(Drainage area 374 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	135	96	119.0	0.318	0.37	7,317
February	124	76	98.5	0.263	0.27	5,470
March	107	76	88.0	0.235	0.27	5,411
April	1,184	112	612.0	1.640	1.83	36,417
May	5,016	779	1,954.0	5.220	6.02	120,148
June	4,859	1,565	2,709.0	7.240	8.08	161,196
July	1,640	450	789.0	2.110	2.43	48,514
August	720	298	426.0	1.140	1.31	26,194
September	321	232	265.0	0.709	0.79	15,769
October	610	232	395.0	1.060	1.22	24,288
November	370	274	345.0	0.928	1.03	20,529
December	254	101	138.0	0.369	0.42	8,485
The year	.....	.....	.....	.....	24.04	479,738

MILL CREEK NEAR MOUNTAIN MILL.

This station was established July 7, 1910, by H. C. Ritchie. It is located on the S.W ¼ Sec. 18, Tp. 6, Rge. 1, W. 5th Mer., at the site of the abandoned Government mill, nine and a half miles west of Pincher Creek P. O.

The gauge, which is a plain staff graduated to feet and hundredths, is placed at the left bank. It is referred to a bench mark on a spike at the northeast corner of the mill, (elev. 10.97 above the zero of the gauge).

The channel is straight for 200 feet above and 300 feet below the station. Both banks are high, clean rocky and will not overflow. The bed of the stream is of gravel, giving a stable cross section. The current is swift.

Discharge measurements in flood stages are made from the bridge. In normal and low water stages the creek is waded 50 feet upstream from the gauge, the initial point for soundings being a stake on the left bank.

During 1913 the gauge was read by K. B. Parsons.

Discharge Measurements of Mill Creek near Mountain Mill, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-f.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 28	H O Brown	46.0	43.6	3 04	2.16	133
May 15	R Palmer	48.0	58.2	3.56	2.40	207
July 2	do	51.0	61.4	3.87	2.55	238
July 16	do	43.0	32.4	2.54	1.95	82
Aug 8	do	40.0	24.1	1.97	1.75	48
Aug 26	do	32.0	22.1	1.71	1.73	38
Sept 15	do	39.0	21.6	1.66	1.65	36
Sept 27	do	36.0	23.2	1.29	1.65	30
Oct 15	do	51.0	49.2	3.20	2.25	157
Nov 10	do	40.0	29.0	2.12	1.89	62

Daily Gauge Height and Discharge of Mill Creek near Mountain Mill, for 1913.

Day.	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*	*Feet.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.20	144	3.30	468	2.60	258	1.75	45	1.76	46	1.32	12.8
2	2.16	133	3.26	456	2.55	243	1.75	45	1.75	45	1.32	12.8
3	2.15	130	3.14	420	2.54	240	1.75	45	1.75	45	1 30	12.0
4	2.16	133	3.10	408	2.54	240	1.75	45	1.73	42	1.38	15.2
5	2.13	125	3.00	378	2.26	161	1.75	45	1.73	42	1.50	20.0
6	2.10	117	2.84	330	2.25	158	1.77	48	1.73	42	1.50	20.0
7	2.11	120	2.76	306	2.20	144	1.77	48	1.73	42	1.50	20.0
8	2.18	138	2.74	300	2.19	141	1.98	87	1.72	41	1.66	33.0
9	2.25	158	2.73	297	2.13	125	2 55	243	1.71	39	1.73	42.0
10	2.25	158	2 74	300	2.11	120	2 21	147	1.68	36	1.65	32.0
11	2.30	172	2.89	345	2.09	114	2 11	120	1.67	34	1.65	32.0
12	2.35	186	2.79	315	2 05	104	1 99	90	1.66	33	1.65	32.0
13	2.45	214	2.72	294	2.02	97	1 96	82	1.65	32	2.25	158.0
14	2.49	225	2.70	288	2.00	92	1 88	65	1 64	31	3.01	381.0
15	2.40	200	2.53	237	1.87	64	1 83	57	1.63	30	2 50	228.0
16	2.55	243	2 44	211	1 85	60	1.81	54	1 67	34	2 10	117.0
17	2.57	249	2.39	197	1.84	58	1.91	71	1 64	31	1.99	90.0
18	2.80	318	2 36	189	1.84	58	1 96	82	1.70	38	1 94	78.0
19	2.75	303	2.34	183	1.83	57	1 92	73	1 68	36	1.91	71.0
20	2.90	348	2.33	180	1.81	54	1.88	65	1.64	31	1.98	87.0
21	3.02	384	2 32	178	1 80	52	1 78	49	1 60	27	1.88	65.0
22	3.10	408	2 32	178	1.78	49	1.76	46	1 72	41	1.91	71.0
23	3.30	468	2 31	175	1 76	46	1.76	46	1 72	41	1.95	80.0
24	3.31	471	2 30	172	1.76	46	1.73	42	1 70	38	1.89	67.0
25	3.33	477	2.30	172	1.76	46	1.73	42	1 67	34	1.85	60.0
26	3.35	483	3.01	381	1.78	49	1.73	42	1.63	30	1 85	60.0
27	3.46	516	3.43	507	1 77	48	1.73	42	1.65	32	1 86	62.0
28	3 35	483	3.54	540	1.78	49	1.73	42	1.64	31	1.86	62.0
29	3.31	471	3.51	531	1.78	49	1.73	42	1.63	30	1 88	65.0
30	3.31	471	3.10	408	1.76	46	1.75	45	1.63	30	1 89	67.0
31	3.30	468			1.76	46	1.86	62			1.88	65.0

Monthly Discharge of Mill Creek near Mountain Mill, for 1913.

(Drainage area 66 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May	516	117.0	288.0	4.360	5.03	17,708
June	540	172.0	311.0	4.710	5.26	18,506
July	258	46.0	100.0	1.520	1.75	6,149
August	243	42.0	66.4	1.010	1.16	4,083
September	46	27.0	36.1	0.547	0.61	2,148
October	381	12.0	71.5	1.080	1.24	4,396
The period					15.05	52,990

CANYON CREEK NEAR MOUNTAIN MILL.

This station was established July 6, 1910, by H. C. Ritchie. It is located on the N.E. ¼ Sec. 14, Tp. 6, Rge. 2, W. 5th Mer., near G. Biron's ranche.

The gauge, which is a plain staff graduated to feet and hundredths., is placed at the left bank within 75 feet of Mr. Biron's corral. It is referred to a bench mark on a spike in a tree within fifteen feet; elevation 14.49.

The channel is straight for 150 feet above and 30 feet below the station. Both banks are high, wooded, and will not overflow. The bed of the stream is of clean gravel and rock. The current is very swift and turbulent. On this account discharge measurements are made about one half mile upstream at the traffic bridge on the road allowance to the Beaver coal mines.

During high water stages, discharge measurements are made from the bridge; the initial point for soundings is on a line with the face of the left abutment. At ordinary stages the stream is waded about 100 yards downstream, the initial point for soundings being marked by a hub on the left bank.

During 1913 the gauge was read by G. Biron.

Discharge Measurements of Canyon Creek near Mountain Mill, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 28	H O Brown	21.5	26.6	1.94	5.13	52.00
May 15	R Palmer	25.0	31.8	1.55	5.03	49.00
June 6	do	22.5	21.9	1.21	4.79	27.00
July 2	do	23 0	16.8	0.84	4.51	14.10
July 16	do	18.0	13.0	0.52	4.29	6.80
Aug 8	do	18.5	11.7	0.34	4.18	4.00
Aug 26	do	17.0	10.1	0.29	4.07	2.90
Sept 15	do	18.5	10.9	0 22	3.99	2.40
Sept 27	do	17.0	10.3	0.19	3.99	1.97
Oct 15	do	18.5	11.0	0.20	3.99	2.20
Nov 10	do	18.5	12.9	0.36	4.14	4.70

Daily Gauge Height and Discharge of Canyon Creek near Mountain Mill, for 1913

Day.	April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	5.03	46	4.92	36.0
2	.....	.....	5.03	46	4.88	33.0
3	.....	.....	5.01	43	4.83	29.0
4	.....	.....	4.99	42	4.81	28.0
5	.....	.....	4.91	35	4.77	26.0
6	.....	.....	4.91	35	4.74	24.0
7	.....	.....	4.94	37	4.72	23.0
8	.....	.....	4.99	42	4.70	22.0
9	.....	.....	5.07	50	4.69	21.0
10	.....	.....	5.11	54	4.65	19.4
11	.....	.....	5.09	52	4.62	18.1
12	.....	.....	5.09	52	4.63	18.6
13	.....	.....	5.14	58	4.65	19.5
14	*a* 4.99	42	5.09	52	4.61	17.7
15	5.29	76	5.04	47	4.57	16.1
16	5.34	83	5.05	47	4.43	11.1
17	5.33	82	5.19	64	4.52	14.2
18	5.39	89	5.24	70	4.52	14.2
19	5.49	102	5.29	76	4.53	14.5
20	5.59	115	5.23	69	4.61	17.7
21	5.64	122	5.19	64	4.52	14.2
22	5.49	102	5.14	58	4.48	12.7
23	5.29	76	5.19	64	4.44	11.4
24	5.23	69	5.14	58	4.44	11.4
25	5.14	58	5.10	53	4.43	11.1
26	5.19	64	5.07	50	4.67	20.0
27	5.19	64	5.09	52	4.72	23.0
28	5.14	58	5.07	50	4.80	27.0
29	5.09	52	5.03	46	4.67	20.0
30	5.02	44	4.99	42	4.60	17.2
31	.....	.....	4.95	38	.....	.....

a Observations commenced.

Daily Gauge Height and Discharge of Canyon Creek near Mountain Mill, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.53	14.5	4.14	4.0	4.07	3.1	3.99	2.3
2	4.51	13.8	4.14	4.0	4.04	2.8	3.98	2.3
3	4.49	13.1	4.12	3.7	4.05	2.9	3.98	2.3
4	4.47	12.4	4.10	3.4	4.05	2.9	4.08	3.2
5	4.42	10.8	4.09	3.3	4.01	2.5	4.09	3.3
6	4.34	8.4	4.08	3.2	4.01	2.5	4.06	3.0
7	4.34	8.4	4.07	3.1	4.01	2.5	4.05	2.9
8	4.29	7.1	4.18	4.7	4.02	2.6	4.05	2.9
9	4.26	6.4	4.22	5.5	4.02	2.6	4.06	3.0
10	4.24	5.9	4.22	5.5	4.02	2.6	4.07	3.1
11	4.24	5.9	4.21	5.2	4.01	2.5	4.09	3.3
12	4.29	7.1	4.16	4.4	3.99	2.3	4.10	3.4
13	4.31	7.6	4.14	4.0	3.99	2.3	4.10	3.4
14	4.27	6.6	4.15	4.2	3.98	2.3	4.08	3.2
15	4.26	6.4	4.25	6.2	3.99	2.3	4.07	3.1
16	4.26	6.4	4.15	4.2	3.97	2.2	4.07	3.1
17	4.26	6.4	4.14	4.0	3.96	2.2	4.07	3.1
18	4.21	5.2	4.14	4.0	3.96	2.2	4.09	3.3
19	4.19	4.8	4.13	3.9	3.99	2.3	4.09	3.3
20	4.19	4.8	4.12	3.7	4.01	2.5	4.10	3.4
21	4.19	4.8	4.11	3.6	4.01	2.5	4.10	3.4
22	4.22	5.5	4.10	3.4	4.06	3.0	4.12	3.7
23	4.22	5.5	4.10	3.4	4.05	2.9	4.10	3.4
24	4.15	4.2	4.09	3.3	4.03	2.7	4.14	4.0
25	4.15	4.2	4.19	4.8	4.03	2.7	4.13	3.9
26	4.15	4.2	4.07	3.1	4.01	2.5	4.14	4.0
27	4.14	4.0	4.08	3.2	3.99	2.3	4.15	4.2
28	4.13	3.9	4.07	3.1	3.99	2.3	4.16	4.4
29	4.24	5.9	4.05	2.9	3.98	2.3	4.16	4.4
30	4.27	6.6	4.06	3.0	4.01	2.5	4.14	4.0
31	4.16	4.4	4.06	3.0	.....	.....	4.13	3.9

Monthly Discharge of Canyon Creek near Mountain Mill, for 1913.

(Drainage area 27 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
April (14-30)	122.0	42.0	76.40	2.830	1.79	2,576
May	76.0	35.0	51.40	1.900	2.19	3,160
June	36.0	11.1	19.70	0.730	0.81	1,172
July	14.5	3.9	6.94	0.257	0.30	427
August	6.2	2.9	3.90	0.144	0.17	240
September	3.1	2.2	2.53	0.094	0.10	150
October	4.4	2.3	3.36	0.124	0.14	207
The period	.....	.....	.....	.....	5.50	7,932

OLDMAN RIVER NEAR COWLEY.

This station was established by H. C. Ritchie, on September 15, 1908. It is located at a ford on the N.E. ¼ Sec. 34, Tp. 7, Rge. 1, W. 5th Mer., and is approximatively four miles northeast of Cowley.

The gauge, which is a plain staff graduated to feet and hundredths, is securely fastened to a post on the right bank. The zero of the gauge (elev. 92. 8) is referred to a permanent iron bench mark (assumed elev. 100.00) located on the right bank of the river 90 feet east of the gauge.

The channel is straight for about 900 feet above and 250 feet below the section. The bed is of rock and gravel and is free from vegetation. The current has considerable velocity but

flows smoothly untill about 150 feet below the section, where it breaks into small rapids. Both banks are high and wooded, neither being liable to overflow.

Discharge measurements are made at the gauge, where a cable station has been erected for use during high water stages. During low water the river is waded at the same section. The points for soundings are permanently marked by a tagged wire, stretched directly above the cable.

During 1913, the gauge was read by J. H. Hughes.

DISCHARGE MEASUREMENTS of Oldman River near Cowley, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan 7	H O. Brown	140	97.0	1.06	2.74	102
Feb. 10	do	140	103.0	1.10	3.65	113
Feb. 26	do	135	96.5	1.18	3.64	114
Mar. 25	do	130	82.5	0.90	3.60	74
April 23	do	193	317.0	3.12	2.65	990
June 12	R. Palmer	200	470.0	4.20	3.39	1,974
June 28	do	194	350.8	3.01	2.89	1,054
July 15	do	185	244.0	2.23	2.23	344
Aug. 9	do	180	195.0	1.90	2.04	371
Aug. 27	do	180	193.0	1.80	1.98	349
Sept. 13	do	182	183.0	1.76	1.94	322
Oct. 1	do	146	157.0	1.55	1.81	244
Oct. 21	do	180	194.0	1.79	2.00	348
Nov. 4	do	155	158.0	1.66	1.85	263
Nov. 27	do	100	130.0	1.43	1.80	186
Dec. 11	do	100	129.0	1.42	1.80	184

DAILY GAUGE HEIGHT AND DISCHARGE of Oldman River near Cowley, for 1913.

DAY.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.65	*a*145	3.44	124	3.80	113	3.60	130	2.43	698	3.49	2,143
2	2.67	141	3.44	120	3.80	115	3.59	150	2.43	698	3.49	2,143
3	2.69	138	3.46	116	3.90	118	3.59	180	2.47	736	3.48	2,126
4	3.00	126	3.49	111	3.90	121	3.70	200	2.41	680	3.47	2,109
5	2.80	113	3.49	107	4.00	122	3.82	250	2.38	652	3.46	2,092
6	2.90	105	3.51	106	4.00	124	3.86	300	2.28	563	3.46	2,092
7	2.90	102	3.50	106	4.00	125	3.65	350	2.28	563	3.45	2,075
8	3.00	102	3.49	108	4.10	126	3.52	400	2.18	480	3.47	2,109
9	3.00	105	3.60	110	4.00	125	3.35	450	2.16	465	3.55	2,245
10	3.20	106	3.65	113	3.70	124	3.23	500	2.37	643	3.50	2,160
11	3.30	105	3.65	116	3.67	118	3.10	*a*600	2.83	1,123	3.49	2,143
12	3.30	102	3.65	118	3.66	117	2.60	865	3.53	2,211	3.39	1,973
13	3.60	103	3.66	120	3.64	115	2.40	670	3.36	2,381	3.43	2,041
14	2.83	103	3.68	121	3.60	111	2.30	580	3.58	2,296	3.41	2,007
15	2.86	102	3.70	122	3.58	105	2.40	670	3.60	2,330	3.39	1,973
16	2.88	99	3.90	123	3.60	102	2.50	765	3.61	2,347	3.34	1,888
17	2.94	97	3.90	123	3.60	97	2.55	815	3.63	2,381	3.24	1,718
18	2.98	97	3.70	123	3.58	93	2.80	1,085	3.62	2,364	3.18	1,618
19	3.00	98	3.70	122	3.57	88	2.90	1,210	3.60	2,330	2.99	1,332
20	3.05	99	3.70	122	3.56	86	3.09	1,475	3.58	2,296	2.92	1,237
21	3.08	101	3.90	121	3.53	84	3.09	1,475	3.56	2,262	2.84	1,135
22	3.11	104	3.70	120	3.50	80	3.10	1,490	3.56	2,262	2.79	1,074
23	3.14	107	3.65	118	3.46	77	2.65	918	3.57	2,279	3.09	1,475
24	3.14	111	3.65	117	3.44	76	2.63	897	3.57	2,279	3.19	1,634
25	3.13	115	3.64	115	3.42	74	2.68	949	3.58	2,296	2.87	1,173
26	3.11	118	3.64	114	3.48	75	2.73	1,004	3.55	2,245	2.85	1,147
27	3.11	121	3.63	113	3.50	79	2.67	939	3.54	2,228	2.89	1,197
28	3.14	123	3.64	113	3.55	92	2.53	795	3.54	2,228	2.92	1,237
29	3.16	125	.....	.....	3.60	107	2.39	661	3.54	2,228	2.87	1,173
30	4.35	125	.....	.....	3.60	114	2.38	652	3.53	2,211	2.83	1,123
31	4.30	126	.....	.....	3.60	119	.....	.....	3.53	2,211	.....	.....

a Ice conditions Jan. 1 to April 11.

Daily Gauge Height and Discharge of Oldman River near Cowley, for 1913. (*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.07	1,446	2 25	537	2.13	442	1 79	245	1 85	275	1 78	180
2	2 67	939	2.09	413	2 13	442	1.80	250	1.84	270	1.78	185
3	2.64	907	2 22	512	2 14	450	1 84	270	1.84	270	1.81	180
4	2.62	886	2 18	480	2.14	450	1.79	245	1 83	265	1.82	175
5	2.57	835	2.05	388	2 14	450	1.86	280	1.83	265	1.83	180
6	2.52	785	1 96	333	2.14	450	1 85	275	1.82	260	1.83	180
7	2 37	643	2 44	708	2 08	407	1 85	275	1 83	265	1 84	175
8	2.37	643	2 79	1,074	2 08	407	1 84	270	1.85	275	1 82	170
9	2.32	598	2 65	918	2 03	375	1.83	265	1.87	285	1 82	175
10	2.33	607	2.59	855	2.00	355	1 84	270	1.87	285	1.81	180
11	2.27	555	2 54	805	1.98	344	1 84	270	1.90	*a*290	1 80	185
12	2 27	555	2 50	765	1 92	311	1 86	280	1 91	292	1 80	185
13	2 22	512	2 44	708	1 92	311	1.86	280	1.91	292	1 80	185
14	2.17	472	2 39	661	1 91	306	1 86	280	1 93	295	1.80	185
15	2.18	480	2 34	616	1.90	300	1 87	285	1 93	295	1 81	180
16	2.16	465	2 28	563	1 88	290	1 87	285	1 94	297	1 80	185
17	2.15	458	2 24	529	1 88	290	1 88	290	1 94	295	1 81	185
18	2.16	465	2 24	529	1.88	290	1 88	290	1.95	290	1 83	185
19	2.15	458	2 24	529	1 87	285	1 89	295	1.95	260	1.83	180
20	2.15	458	2 17	472	1 86	280	1 91	305	1 97	230	1 84	175
21	2.15	458	2 17	472	1 86	280	1 91	305	1 97	230	1 84	170
22	2.16	465	2 14	450	1 86	230	1 91	305	1 98	220	1 85	175
23	2.17	472	2 11	428	1 88	290	1 93	316	1.98	240	1 85	175
24	2.17	472	2 09	413	1 88	290	1 92	311	2 02	250	1.85	170
25	2.18	472	2 09	413	1.88	290	1 92	311	1.94	230	1 87	160
26	2.18	480	2 09	413	1.85	275	1 90	300	1.85	200	1 88	160
27	2.19	488	2 07	400	1.85	275	1 88	290	1.78	185	1 90	160
28	2.29	571	2 06	394	1 83	265	1 88	290	1 78	185	1.91	170
29	2.24	529	2 07	400	1.81	255	1 87	285	1.77	180	1 91	170
30	2.24	529	2 08	407	1.81	255	1 87	285	1 77	180	1.92	165
31	2.24	529	2 10	420			1.86	280			1.92	*a*160

a Ice conditions Nov. 11 to Dec. 31.

Monthly Discharge of Oldman River near Cowley, for 1913.

(Drainage area 820 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	145	97	112	0.136	0.16	6,887
February	121	106	116	0.141	0.15	6,442
March	126	74	104	0.127	0.15	6,395
April	1,490	130	714	0.871	0.97	42,486
May	2,381	465	1,709	2.080	2.40	105,082
June	2,245	1,071	1,720	2.100	2.34	102,347
July	1,446	458	601	0.733	0 84	36,954
August	1,074	331	548	0.668	0.77	33,695
September	450	255	333	0.406	0.45	19,815
October	316	245	283	0.345	0.40	17,401
November	297	180	255	0.311	0.35	15,174
December	185	160	176	0.214	0.25	10,822
The year					9.23	403,500

TODD CREEK AT ELTON'S RANCHE.

This station was established by H. C. Ritchie on August 3, 1909. It is located seven miles northwest of Cowley, at a private foot bridge about twenty feet from Cecil Elton's house, on the S.W. ¼ Sec. 19, Tp. 8, Rge. 1, W. 5th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is driven into the bed of the stream and securely braced to the left bank. The zero of the gauge (elev. 93.02) is referred to a permanent iron bench mark (assumed elev. 100.00), twelve feet northeast of the gauge.

The channel is straight for about 55 feet above and 60 feet below the gauge. The right bank is high and wooded and liable to overflow in extreme high water. The left bank is wooded, and liable to overflow for about six feet. The bed lies in one channel and is composed of clean sand and gravel. The current is inclined to be swift at high stages, but is quite sluggish at low.

Discharge measurements are made from the foot bridge with current meter and rods. During high stages measurements are made from a private traffic bridge 1000 feet downstream.

During 1913, the gauge was read by Cecil Elton.

Cecil Elton and Capt. Cardwell have irrigation ditches which divert water at points above this station.

DISCHARGE MEASUREMENTS of Todd Creek at Elton's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 25	H. O. Brown	19.7	31.6	0.93	3.12	29.0
May 20	R. Palmer	19.5	31.4	2.14	3.50	67.0
June 11	do	19.4	27.9	1.67	3.30	46.0
June 30	do	21.5	25.0	1.04	3.05	26.0
July 17	do	21.5	18.1	0.71	2.81	12.9
Aug. 12	do	21.0	17.4	0.41	2.70	7.2
Aug. 28	do	20.5	21.3	0.22	2.60	4.7
Sept. 12	do	20.0	20.9	0.20	2.62	4.2
Oct. 2	do	20.0	20.3	0.22	2.60	4.4
Oct. 18	do	21.0	23.2	0.23	2.70	5.4
Nov. 5	do	21.0	21.6	0.26	2.70	5.5

Daily Gauge Height and Discharge of Todd Creek at Elton's Ranche, for 1913.

Day.	April.		May.		June.	
	Guage Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			3.07	27	3.41	58
2			3.14	32	3.41	58
3			3.09	28	3.41	58
4			3.09	28	3.43	60
5			3.08	28	3.43	60
6	7.25	*a*	3.07	27	3.41	58
7	7.75		3.05	26	3.40	57
8	7.79		3.09	28	3.37	54
9	7.43		3.18	35	3.37	54
10	6.83		3.17	35	3.37	54
11	6.81		3.15	33	3.39	56
12	7.02		3.13	31	3.40	57
13	7.03		3.23	40	3.39	56
14	6.49		3.25	42	3.35	52
15	5.57		3.21	38	3.27	44
16	4.94		3.27	44	3.21	38
17	4.57	*a*	3.36	52	3.17	35
18	3.84	104	3.29	46	3.13	31
19	3.45	63	3.49	67	3.13	31
20	3.45	63	3.47	65	3.17	35
21	3.46	64	3.39	56	3.11	30
22	3.40	57	3.30	46	3.06	26
23	3.24	41	3.29	46	3.03	24
24	3.03	24	3.29	46	3.05	26
25	3.11	30	3.29	46	3.03	24
26	3.13	31	3.31	48	3.09	28
27	3.09	28	3.36	52	3.18	35
28	3.09	28	3.43	60	3.16	34
29	3.06	26	3.45	63	3.06	26
30	3.02	23	3.47	65	2.99	21
31			3.50	68		

a Ice conditions April 6 to 17; not sufficient data to compute discharge.

Daily Gauge Height and Discharge of Todd Creek at Elton's Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.99	21.0	2.75	9.2	2.71	7.7	2.61	4.8
2	3.00	22.0	2.73	8.4	2.72	8.1	2.59	4.3
3	2.96	19.6	2.70	7.3	2.65	5.9	2.59	4.3
4	2.95	19.0	2.69	7.0	2.64	5.6	2.64	5.6
5	2.95	18.4	2.68	6.7	2.63	5.3	2.64	5.6
6	2.92	17.2	2.67	6.5	2.61	4.8	2.63	5.3
7	2.88	15.0	2.69	7.0	2.60	4.5	2.63	5.3
8	2.88	15.0	2.73	8.4	2.59	4.3	2.63	5.3
9	2.85	13.5	2.89	15.5	2.59	4.3	2.64	5.6
10	2.87	14.5	2.90	16.0	2.58	4.1	2.63	5.3
11	2.86	14.0	2.77	10.0	2.60	4.5	2.65	5.9
12	2.86	14.0	2.73	8.4	2.60	4.5	2.72	8.1
13	2.86	14.0	2.70	7.3	2.60	4.5	2.75	9.2
14	2.85	13.5	2.71	7.7	2.60	4.5	2.73	8.4
15	2.83	12.6	2.71	7.7	2.59	4.3	2.71	7.7
16	2.81	11.6	2.69	7.0	2.59	4.3	2.65	5.9
17	2.81	11.6	2.71	7.7	2.59	4.3	2.66	6.2
18	2.79	10.7	2.73	8.4	2.59	4.3	2.75	9.2
19	2.79	10.7	2.71	7.7	2.59	4.3	2.68	6.7
20	2.78	10.3	2.66	6.2	2.59	4.3	2.63	5.3
21	2.78	10.3	2.64	5.6	2.59	4.3	2.61	4.8
22	2.87	14.5	2.63	5.3	2.61	4.8	2.61	4.8
23	2.83	12.6	2.63	5.3	2.64	5.6	2.61	4.8
24	2.79	10.7	2.63	5.3	2.62	5.1	2.61	4.8
25	2.80	11.1	2.61	4.8	2.61	4.8	2.61	4.8
26	2.96	19.6	2.61	4.8	2.61	4.8	2.61	4.8
27	2.86	14.0	2.61	4.8	2.60	4 5	2.63	5.3
28	2.78	10.3	2.61	4.8	2.59	4.3	2.61	4.8
29	2.77	10.0	2.59	4.3	2.59	4.3	2.64	5.6
30	2.85	13.5	2.60	4.5	2.61	4.8	2.68	6.7
31	2.77	10.0	2.67	6.5	.....	.....	2.57	3.9

Monthly Discharge of Todd Creek at Elton's Ranche, for 1913.

(Drinage area 57 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (18-30)	104.0	23.0	44.80	0.787	0.38	1,155
May	68.0	26.0	43.50	0.763	0.88	2,675
June	60.0	21.0	42.70	0.750	0.84	2,541
July	22.0	10.0	14.00	0.246	0.28	861
August	16.0	4.3	7.29	0.128	0.15	448
September	8.1	4.1	4.86	0.085	0.09	289
October	9.2	3.9	5.78	0.101	0.12	355
The period	.....	.....	.....	.....	2.74	8,324

COW CREEK NEAR COWLEY.

This station was established on May 26, 1910, by H. C. Ritchie; it replaced the station on Sec. 12, Tp. 8, Rge. 2, W. 5th Mer., established August 2, 1909. It is located on the N.E. ¼ Sec. 14, Tp. 8, Rge. 2, W. 5th Mer.; at John Ross's ranche, five miles north of Lundbreck station.

The gauge, which is a plain staff graduated to feet and hundredths, is located at the right bank. The zero (elev. 94.53) is referred to a permanent iron bench mark (assumed lev. 100.00), located on the right bank of the creek, 30 feet north of the gauge and 20 feet from the edge of the creek.

The channel is curved above the gauge and is straight 50 feet below. Both banks are low and partly covered with bushes, but are not liable to overflow. The bed is of clean sand and gravel. The current is swift.

Discharge measurements are made with meter and rods from a temporary foot bridge at the gauge. The initial point for soundings is a stake on the left bank.

During 1913, the gauge was read by William McKay.

DISCHARGE MEASUREMENTS of Cow Creek near Cowley, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24	H. O. Brown	8.9	11.14	1.32	2.30	14.70
May 20	R. Palmer	8.0	9.65	3.03	2.51	29.00
June 11	do	9.7	8.39	2.24	2.30	18.80
June 30	do	7.8	6.51	1.23	2.06	8.00
July 17	do	7.5	4.85	0.79	1.87	3.80
Aug. 12	do	8.0	4.41	0.44	1.68	1.95
Aug. 28	do	8.5	4.22	0.30	1.60	1.25
Spet. 12	do	8.5	3.69	0.25	1.65	0.92
Oct. 2	do	8.5	4.62	0.32	1.65	1.47
Oct. 18	do	8.5	5.01	0.34	1.70	1.68
Nov. 5	do	9.5	6.88	0.73	1.90	5.00

DAILY GAUGE HEIGHT AND DISCHARGE of Cow Creek near Cowley, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.91	.....*a*	2.21	12 8	2 61	29.0
2	1.72	.....	2.24	13.9	2.59	28.0
3	1.70	.....	2.20	12.4	2 58	27.0
4	1.90	.....	2.34	17.7	2.58	27.0
5	4.00	.....	2.20	12.4	2 49	24.0
6	4.54	.....	2.18	11 8	2 49	24.0
7	4.85	.....	2.19	12.1	2.39	19.6
8	3.60	.....	2.28	15.4	2 39	19.6
9	4.20	.....	2.39	19.6	2 39	19.6
10	3.29	.....	2.38	19.2	2.37	18.8
11	2.83	.....	2.29	15.7	2 37	18.8
12	3.70	.....	2.29	15.7	2 40	20 0
13	4.02	....*a*	2.54	26.0	2.37	18.8
14	3.29	67.0	2.39	19.6	2.29	15.7
15	3.01	45.0	2.30	16.1	2 29	15.7
16	2.94	42 0	2.30	16.1	2 25	14.2
17	2.80	37.0	2.40	20.0	2 23	13.5
18	2.83	38 0	2.40	20 0	2 20	12.4
19	2.78	36.0	2.75	34.0	2.19	12.1
20	2.85	39.0	2.49	24.0	2.19	12.1
21	2.78	36.0	2.40	20.0	2.18	11.8
22	2.55	26.0	2.40	20.0	2 18	11.8
23	2.31	16 5	2.39	19.6	2.16	11.1
24	2 29	15.7	2.39	19.6	2.15	10.8
25	2.25	14.2	2.40	20.0	2.14	10.5
26	2.29	15 7	2.44	22.0	2 38	19.2
27	2.30	16 1	2.58	27.0	2.20	12.4
28	2.21	12 8	2.61	29.0	2.18	11.8
29	2.21	12 8	2.63	30 0	2 17	11.4
30	2.19	12.1	2.67	31.0	2.10	9.4
31			2.66	31.0		

a Ice conditions April 1-13; not sufficient data to compute discharge.

DAILY GAUGE HEIGHT AND DISCHARGE of Cow Creek near Cowley, for 1913.—(*Concluded*).

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.10	9.2	1.82	3.30	1.75	1.96	1.61	1.27
2	2.02	7.1	1.81	3.20	1.70	1.90	1.61	1.27
3	2.00	6.6	1.81	3.20	1.64	1.48	1.61	1.27
4	2.00	6.6	1.80	3.00	1.64	1.48	1.63	1.41
5	2.00	6.6	1.80	3.00	1.62	1.34	1.69	1.83
6	1.99	6.4	1.79	2.90	1.61	1.27	1.70	1.90
7	1.98	6.2	1.68	1.76	1.60	1.20	1.64	1.48
8	1.93	5.1	1.74	1.94	1.60	1.20	1.68	1.76
9	1.91	4.7	1.96	5.80	1.60	1.20	1.63	1.41
10	1.90	4.5	1.83	3.40	1.59	1.13	1.62	1.34
11	1.99	6.4	1.79	2.90	1.65	1.55	1.64	1.48
12	1.91	5.3	1.71	1.91	1.64	1.48	1.80	3.00
13	1.90	4.5	1.70	1.90	1.62	1.34	1.73	2.23
14	1.90	4.5	1.70	1.90	1.62	1.34	1.71	1.91
15	1.88	4.2	1.69	1.83	1.61	1.27	1.69	1.83
16	1.88	4.2	1.69	1.83	1.61	1.27	1.67	1.69
17	1.87	4.0	1.69	1.83	1.60	1.20	1.67	1.69
18	1.86	3.9	1.69	1.83	1.60	1.20	1.68	1.76
19	1.86	3.9	1.69	1.83	1.61	1.27	1.70	1.90
20	1.84	3.6	1.68	1.76	1.61	1.27	1.70	1.90
21	1.84	3.6	1.68	1.76	1.61	1.27	1.69	1.83
22	1.91	4.7	1.68	1.76	1.67	1.69	1.68	1.76
23	1.86	3.9	1.66	1.62	1.69	1.83	1.68	1.76
24	1.85	3.8	1.61	1.27	1.69	1.83	1.67	1.69
25	1.84	3.6	1.61	1.27	1.68	1.76	1.66	1.62
26	2.09	8.9	1.61	1.27	1.67	1.69	1.67	1.69
27	1.89	4.3	1.60	1.20	1.63	1.41	1.67	1.69
28	1.84	3.6	1.60	1.20	1.63	1.41	1.68	1.76
29	1.87	4.0	1.60	1.20	1.62	1.34	1.67	1.69
30	1.86	3.9	1.60	1.20	1.61	1.27	1.67	1.69
31	1.80	3.0	1.66	1.62	.....	.....	1.67	1.69

MONTHLY DISCHARGE of Cow Creek near Cowley, for 1913.

(Drainage area 28 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (14-30)	67.00	12.10	28.30	1.010	0.64	954
May	34.00	11.80	20.10	0.718	0.83	1,236
June	29.00	9.40	17.00	0.609	0.68	1,012
July	9.20	3.00	5.00	0.179	0.21	307
August	5.80	1.20	2.14	0.076	0.09	132
September	1.96	1.13	1.43	0.051	0.06	85
October	3.00	1.27	1.72	0.061	0.07	106
The period	.....	.....	.....	.....	2.58	3,832

CONNELLY CREEK NEAR LUNDBRECK.

This station was established on July 31, 1909, by H. C. Ritchie. It is located at a foot-bridge on the trail in the S.E. ¼ Sec. 36, Tp. 7, Rge. 2, W. 5th Mer., and is about 100 feet from the mouth of the creek.

There is no observer for the gauge at this station.

DISCHARGE MEASUREMENTS of Connelly Creek near Lundbreck, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24	H. O. Brown	12.0	8.30	1.24	2.58	10.30
June 30	R. Palmer	11.7	5.80	0.75	2.43	4.35
July 17	do	10.5	4.52	0.37	2.40	1.76
Aug. 12	do	10.0	4.18	0.08	2.25	0.32
Nov. 5	do	12.0	5.15	0.14	1.60	0.73

CROWSNEST RIVER AT LUNDBRECK.

This station was established September 7, 1907, by P. M. Sauder. It is located on the N.E. ¼ Sec. 26, Tp. 7, Rge. 2, W. 5th Mer., at the traffic bridge just north of Lundbreck.

The gauge, which is a plain staff graduated to feet and hundredths, is placed at the left bank twenty feet downstream from the bridge. The zero of the gauge (elev. 91.76) is referred to a bench mark (assumed elev. 100.00) located on the north abutment of the traffic bridge.

The channel is straight for 250 feet above and 1,500 feet below the station. The right bank is high, wooded and will not overflow. The left bank is low, wooded and liable to overflow in extreme high water. The bed of the stream is of rock, giving a stable cross-section. The current is swift and tumultuous.

Discharge measurements are made from the bridge, the initial point for soundings being marked on the lower downstream chord, on a line with the face of the left abutment.

During 1913 the gauge was read by Ed. Marlow.

DISCHARGE MEASUREMENTS of Crowsnest River at Lundbreck, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Veolcity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 30	H. O. Brown	52.0	67.0	1.05	3.71	70.2
Feb. 12	do	48.0	60.8	1.11	3.76	67.4
" 28	do	50.0	67.2	0.89	3.42	59.9
Mar. 27	do	52.0	59.6	1.12	3.16	72.0
April 7	do	48.5	71.7	1.44	1.63	103.0
" 24	do	68.0	154.0	3.75	2.91	578.0
May 20	R. Palmer	69.0	159.0	3.76	2 96	599.0
June 1	do	66.8	141.5	3.25	2 72	460.0
" 11	do	68.3	195.0	4.29	3 46	838.0
July 17	do	62.0	105.0	2.41	2 12	252.0
Aug. 13	do	62.0	101.0	2.26	2 04	228.0
" 28	do	57.0	88.9	1.97	1.90	175.0
Sept. 12	do	58.0	93.6	1.88	1.89	176.0
Oct. 2	do	55.0	81.0	1.49	1.65	121.0
" 18	do	57.0	87.4	2 00	1.89	175.0
Nov. 5	do	57.0	77.8	1 56	1.69	121.0
" 28	do	56.0	76.6	1.49	1.66	114.0
Dec. 11	do	55.0	74.4	1.53	1.66	114.0

Daily Gauge Height and Discharge of Crowsnest River at Lundbreck, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.56*a*	90	2.68	64	2.45	60	2.12	90	2.62	448	4.09	1,149
2	2.34	85	2.69	63	2.50	61	2.15	94	2.61	444	4.04	1,124
3	2.40	80	2.60	62	2.52	64	2.16	96	2.61	444	3.96	1,084
4	2.48	79	2.35	61	2.48	68	2.20	98	2.52	407	3.86	1,034
5	2.28	78	2.64	60	2.52	72	2.25	100	2.51	403	3.76	984
6	2.32	78	2.77	60	2.50	80	2.40	102	2.52	407	3.71	959
7	2.36	79	2.70	60	2.56	84	2.08*a*	103	2.66	465	3.66	934
8	2.74	79	2.75	60	2.52	88	1.68	117	2.60	440	3.52	864
9	2.65	78	2.75	61	2.50	90	1.67	114	2.59	436	3.54	874
10	2.60	78	2.76	62	2.45	91	1.73	130	2.61	444	3.52	864
11	2.65	77	2.82	64	2.38	91	1.81	153	2.91	573	3.50	854
12	2.68	76	2.70	68	2.40	91	2.01	215	3.01	619	3.41	809
13	2.70	75	2.80	71	2.22	91	2.11	250	3.06	642	3.34	775
14	2.72	74	2.85	76	1.85	90	2.39	355	3.14	679	3.24	726
15	2.60	74	2.82	79	2.05	86	2.67	469	3.02	623	3.12	669
16	2.74	74	2.98	81	2.05	80	2.79	521	3.01	619	2.96	596
17	2.73	75	2.95	82	1.96	74	2.84	543	2.96	596	2.86	551
18	2.75	76	2.80	82	1.60	70	2.97	601	2.91	573	2.81	529
19	2.75	78	2.46	82	1.90	68	3.39	799	3.02	623	2.78	516
20	2.75	80	2.75	81	1.95	66	2.64	924	3.06	642	2.91	573
21	2.75	81	2.76	78	2.05	65	3.71	959	3.04	632	2.86	551
22	2.76	82	2.52	76	2.06	65	3.36	784	3.24	726	2.68	474
23	2.76	82	2.50	72	2.10	66	2.96	596	3.61	909	2.66	465
24	2.76	82	2.45	68	2.05	68	2.91	573	3.76	984	2.68	474
25	2.76	82	2.36	64	2.03	70	2.96	596	3.86	1,034	2.62	448
26	2.76	80	2.25	62	2.05	74	3.01	619	3.98	1,094	2.71	486
27	2.72	77	2.24	61	2.08	76	3.06	642	4.16	1,184	2.76	508
28	2.70	74	2.36	60	2.15	78	2.96	596	4.24	1,224	2.86	551
29	2.74	70	.....	.....	2.11	80	2.91	573	4.21	1,209	2.89	565
30	2.69	70	.....	.....	2.15	84	2.76	508	4.16	1,184	2.81	529
31	2.70	67	.....	.....	2.08	88	.....	.....	4.14	1,174	.....	.....

a Ice conditions Jan. 1 to April 7.

Daily Gauge Height and Discharge of Crowsnest River at Lundbreck, for 1913. (*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.74	499	2.16	268	1.96	199	1.70	122	1.74	133	1.68	111
2	2.70	482	2.14	260	1 91	183	1.69	119	1.71	125	1.61	99
3	2.62	448	2.14	260	1.88	174	1.66	112	1.71	125	1.81*a*	108
4	2 58	432	2.10	246	1.89	177	1.71	125	1.71	125	2.01	116
5	2.52	407	2.07	236	2 04	226	1.71	125	1.71	125	1.61	104
6	2 51	403	2 06	232	2 12	253	1.70	122	1.71	125	1.66	108
7	2 48	391	2.04	226	2 09	243	1.70	122	1.70	122	1.60	106
8	2 46	383	2.10	246	2 01	215	1.68	117	1.66	112	2.04	108
9	2 34	336	2.21	286	1 96	199	1.68	117	1.68	117	2.16	110
10	2.41	363	2.31	324	1.93	190	1.67	114	1.71	125	2.28	112
11	2 44	375	2.28	312	1 89	177	1.66	112	1.72	128	2.16	114
12	2 40	359	2 21	286	1 86	168	1.70	122	1 71	125	2.01	110
13	2 36	343	2.21	286	1 81	153	1.92	186	1.66	112	2.16	112
14	2 32	328	2 21	286	1 81	153	2.06	232	1.68	117	2.26	114
15	2 26	305	2.21	286	1 80	150	2.01	215	1.68	117	2.06	108
16	2 21	286	2 21	286	1 79	147	1.96	199	1.71	125	2.11	110
17	2.18	275	2.14	260	1 78	144	1.96	199	1.74	133	2.26	108
18	2.16	268	2 16	268	1 76	139	2.00	212	1.74	133	3.06	105
19	2.16	268	2 11	250	1 79	147	1.86	168	1.72	128	3.51	102
20	2 16	268	2.06	232	1.77	142	1.84	162	1.68	117	3.06	100
21	2 21	286	2 04	226	1 76	139	1.82	156	1.64	106	3.56	96
22	2 26	305	2.00	212	1 81	153	1.80	150	1.76	139	3.31	92
23	2 21	286	1 96	199	1.80	150	1.80	150	1.71	125	3.21	86
24	2.16	268	1.96	199	1 77	142	1.78	144	1.61	99	3.16	87
25	2.16	268	1.94	193	1.76	139	1.78	144	1.64	106	3.01	89
26	2 22	290	1.94	193	1.72	128	1.76	139	1.66	112	2.96	90
27	2.16	268	1.91	183	1 71	125	1.76	139	1.66	112	2.96	92
28	2.11	250	1.90	180	1.70	122	1.76	139	1.71	125	2.96	93
29	2.16	216	1.89	177	1.70	122	1.75	136	1.61	99	2.81	94
30	2 26	305	1.86	168	1.71	125	1.77	142	1.66	112	2.61	95
31	2.18	275	1.91	183			1.81	153			3.04*a*	94

a Ice conditions Dec. 3 to 31.

Monthly Discharge of Crowsnest River at Lundbreck, for 1913.

(Drainage area 263 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum	Minimum	Mean.	Per square mile.	Depth in inches on Drainage Area.	Total in Acre Feet.
January	90	67	77.8	0.296	0.34	4,784
February	82	60	68.6	0.261	0.27	3,810
March	91	60	76.7	0.292	0.34	4,716
April	959	90	411.0	1.560	1.74	24,456
May	1,224	403	706.0	2.680	3.09	43,410
June	1,149	448	717.0	2.730	3.05	42,664
July	499	216	330.0	1.250	1.44	20,291
August	324	168	240.0	0.912	1.05	14,757
September	253	122	164.0	0.624	0.70	9,759
October	232	112	148.0	0.563	0.65	9,100
November	139	99	120.0	0.456	0,51	7,140
December	117	86	103.0	0.392	0.45	6,333
The year					13.63	191,220

CROWSNEST RIVER NEAR FRANK.

This station was established on July 28, 1910, by H. C. Ritchie. It is located at the traffic bridge on the N.E. ¼ Sec. 36, Tp. 7, Rge. 4 W. 5th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a tree at the left bank about twenty feet downstream. It is referred to a bench mark, consisting of spikes driven into a tree stump, about three feet from the gauge; elevation 9.43 feet above datum of gauge.

The channel is straight for about 200 feet above the station and for 500 feet below, both banks being high, wooded and not liable to overflow. The bed of the stream is clean gravel.

During high water, discharge measurements are made from the bridge, the points for soundings being painted on the lower chord. In low stages the river is waded at the same section. The discharge measurements made at this station during 1913 were all under open water conditions as the river at this point remained open during the winter months.

During 1913, the gauge was read by I. Wilson.

DISCHARGE MEASUREMENTS of Crowsnest River near Frank, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 10	H. O. Brown	50.0	37.3	1.29	4.00	48.1
Jan. 27	do	49.0	35.4	1.27	3.97	45.1
Feb. 14	do	49.5	32.5	1.13	3.90	36.7
Mar. 3	do	49.0	33.7	1.23	3.91	41.4
" 28	do	49.0	34.2	1.13	3.89	38.9
April 9	do	51.0	46.4	1.37	4.05	63.5
" 29	do	69.0	106.0	3.39	5.08	361.0
May 19	R. Palmer	70.0	126.0	3.40	5.22	428.0
June 14	do	73.0	159.0	3.94	5.82	627.7
July 3	do	69.0	102.2	3.05	4.95	312.2
" 21	do	66.5	92.3	2.53	4.85	233.0
Aug. 16	do	65.0	97.1	2.48	4.70	241.0
" 30	do	63.0	69.3	1.95	4.47	135.0
Sept. 17	do	61.0	62.4	1.76	4.32	110.0
" 29	do	60.0	59.0	1.55	4.27	91.4
Oct. 23	do	61.0	63.2	1.71	4.39	108.0
Nov. 6	do	59.0	62.6	1.83	4.32	115.0
" 24	do	54.0	52.6	1.45	4.12	76.0
Dec. 16	do	55.0	52.8	1.36	4.22	71.7
" 30	do	54.0	48.6	1.34	4.12	65.0

Daily Gauge Height and Discharge of Crowsnest River near Frank, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.05	55	3.98	47	3.87	35	3.88	36	4.93	304	6.40	866
2	4.05	55	3.97	45	3.88	36	3.90	38	4.87	281	6.40	866
3	4.05	55	3.97	45	3.89	37	3.90	38	4.85	273	6.30	828
4	4.05	55	3.95	45	3.90	38	3.91	39	4.82	262	6.20	789
5	4.04	54	3.95	45	3.90	38	3.94	42	4.80	254	6.15	770
6	4.04	54	3.94	42	3.90	38	3.94	42	4.80	254	6.10	751
7	4.04	54	3.94	42	3.92	40	3.95	43	4.90	292	6.00	713
8	4.04	54	3.92	40	3.95	43	3.96	44	4.85	273	6.00	713
9	4.04	54	3.91	39	3.95	43	4.00	49	4.83	265	6.00	713
10	4.03	53	3.91	39	3.94	42	4.05	55	4.85	273	6.00	713
11	4.03	53	3.90	38	3.93	41	4.18	75	5.00	331	5.95	694
12	4.03	53	3.90	38	3.90	38	4.25	87	5.15	389	5.88	667
13	4.03	53	3.90	38	3.88	36	4.47	141	5.20	408	5.82	644
14	4.03	53	3.90	38	3.85	33	4.70	216	5.25	427	5.70	598
15	4.03	53	3.90	38	3.87	35	4.95	312	5.20	408	5.55	541
16	4.03	53	3.90	38	3.87	35	5.00	331	5.20	408	5.40	484
17	4.03	53	3.95	43	3.80	28	5.04	346	5.17	397	5.28	438
18	4.03	53	3.95	43	3.80	28	5.10	370	5.15	389	5.25	427
19	4.03	53	3.95	43	3.79	27	5.35	455	5.15	389	5.27	435
20	4.03	53	3.95	43	3.85	33	5.60	560	5.18	400	5.35	455
21	4.03	53	3.96	44	3.85	33	5.70	598	5.20	408	5.30	446
22	4.03	53	3.96	44	3.87	35	5.50	522	5.35	455	5.22	416
23	4.03	53	3.95	43	3.87	35	5.25	427	5.60	560	5.18	400
24	4.03	53	3.94	42	3.87	35	5.10	370	5.90	675	5.15	389
25	4.03	53	3.93	41	3.85	33	5.10	370	6.00	713	5.10	370
26	4.00	49	3.91	39	3.85	33	5.22	416	6.10	751	5.23	419
27	4.00	49	3.89	37	3.85	33	5.25	427	6.25	808	5.25	427
28	4.00	49	3.88	36	3.86	34	5.25	427	6.40	866	5.35	455
29	4.00	49	.....	.....	3.88	36	5.10	370	6.45	885	5.30	416
30	3.98	47	.....	.....	3.87	35	4.95	312	6.40	866	5.25	427
31	3.98	47	.....	.....	3.88	36	.....	.....	6.40	866	.....	.....

Daily Gauge Height and Discharge of Crowsnest River near Frank, for 1913. (*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.18	400	4.65	199	4.39	118	4.25	87	4.30	97	4.32	101
2	5.14	385	4.65	199	4.39	118	4.25	87	4.38	93	3.95	43
3	5.10	370	4.62	188	4.42	127	4.24	86	4.26	89	3.93	41
4	4.98	323	4.57	172	4.45	135	4.28	93	4.25	87	3.94	42
5	4.98	323	4.55	166	4.68	209	4.28	93	4.25	87	3.90	38
6	4.98	323	4.55	166	4.65	199	4.27	91	4.25	87	3.92	40
7	4.98	323	4.54	163	4.60	182	4.25	87	4.30	97	3.95	43
8	4.97	320	4.59	179	4.55	166	4.24	86	4.23	94	4.05	55
9	4.95	312	4.81	258	4.48	144	4.24	86	4.25	87	4.03	53
10	4.94	308	4.80	254	4.45	135	4.23	84	4.27	91	4.05	55
11	4.94	308	4.75	235	4.42	127	4.25	87	4.26	89	4 08	59
12	4.90	292	4.73	227	4.40	121	4.45	135	4.25	87	4.15	69
13	4.88	284	4.70	216	4.40	121	4.60	182	4.26	89	4.15	69
14	4.80	254	4.71	220	4.39	118	4.58	176	4.23	94	4.17	73
15	4.74	231	4.70	216	4.38	116	4.55	166	4.35	108	4.17	73
16	4.70	216	4.68	209	4.35	108	4.50	150	4.28	93	4.16	71
17	4.67	206	4.65	199	4.35	108	4.47	141	4.26	89	4.22	82
18	4.67	206	4.62	189	4.33	104	4.43	129	4.25	87	4.10	62
19	4.68	209	4.60	182	4.33	104	4.41	124	4.23	94	4.06	56
20	4.68	209	4.56	169	4.32	101	4.39	118	4.21	80	4.00	49
21	4.70	216	4.54	163	4.32	101	4.38	116	4.14	68	3 93	41
22	4.70	216	4.53	160	4.32	101	4.36	111	4.05	55	3.95	43
23	4.70	216	4.50	150	4.32	101	4.35	108	4.05	55	3.95	43
24	4.68	209	4.48	144	4.31	99	4.35	108	4.20	78	3 90	38
25	4.65	199	4.46	138	4.31	99	4.34	106	4.22	82	3.83	31
26	4.70	216	4.45	135	4.29	95	4.33	104	4.22	82	3 82	30
27	4.65	199	4.44	132	4.27	91	4.33	104	4.21	80	3.80	28
28	4.61	185	4.42	127	4.26	89	4.33	104	4.19	76	3.90	38
29	4.70	216	4.40	121	4.26	89	4.30	97	4.19	76	3.90	38
30	4.68	209	4.39	118	4.25	87	4.25	87	4.18	75	3.90	38
31	4.66	202	4.39	118	.....	.....	4.27	91	.....	.....	3.95	43

Monthly Discharge of Crowsnest River near Frank, for 1913.

(Drainage area 170 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	55	47	52 5	0 309	0 356	3,228
February	47	36	41 2	0 242	0 252	2,288
March	43	27	35 6	0 209	0 241	2,189
April	598	36	253 0	1 490	1 660	15,055
May	885	254	469 0	2 760	3 180	28,838
June	866	370	577 0	3 390	3 780	34,334
July	400	185	261 0	1 540	1 780	16,048
August	258	118	178 0	1 050	1 201	10,945
September	209	87	120 0	0 706	0 788	7,140
October	182	86	110 0	0 617	0 746	6,764
November	108	55	85 0	0 500	0 558	5,058
December	101	28	51 0	0 300	0 346	3,136
The year	.....	.....	.....	.....	11 897	135,023

MCGILLIVRAY CREEK NEAR COLEMAN.

This station was established on July 23, 1913, by R. Palmer. It is located on the S.E. ¼ Sec. 7, Tp. 8, Rge. 4, W. 5th Mer., about 150 feet north of the traffic bridge crossing the stream a short distance west of the town of Coleman.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a tree at the right banks. The zero of the gauge (elev. 97.01) is referred to a bench mark (assumed elev, 100.00), located on a poplar stump on the left bank about thirty feet from the gauge.

The channel is straight for 100 feet above and below the station. The left bank is low but the right is high. The bed is gravel and the current is swift.

Measurements are made with a current meter by wading near the gauge.

During 1913, the gauge was read by Thos. Blower.

DISCHARGE MEASUREMENTS of McGillivray Creek near Coleman, in 1931.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft.persec.*	*Feet.*	*Sec.-ft.*
Jan. 9	H. O. Brown	15.0	6.95	0.42		3.00
" 28	do	14.6	4.66	0.46		2.20
Feb. 13	do	9.0	3.25	0.53		1.71
Mar. 1	do	6.5	3.87	0.47		1.81
" 28	do	7.2	2.61	0.80		2.10
April 9	do	8.5	2.65	0.66		1.74
" 30	do	19.5	14.90	1.60		24.00
May 17	R. Palmer	20.0	16.24	1.76		29.00
June 13	do	21.0	20.80	2.97		62.00
July 3	do	18.5	12.37	1.43		17.60
" 23	do	17.5	8.62	1.00	1.20*a*	8.60
Aug. 15	do	18.5	12.06	1.14	1.25	13.80
" 29	do	17.5	9.22	0.93	1.25	8.60
Sept. 16	do	17.5	8.35	1.03	1.15	8.60
" 30	do	17.5	9.15	0.83	1.07	7.60
Oct. 24	do	19.0	10.50	1.05	1.30	11.00
Nov. 7	do	17.0	8.53	0.75	1.10	6.40

a Gauge established.

Daily Gauge Height and Discharge of McGillivray Creek near Coleman, for 1913

Day.	August.		September.		October.		November.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.50	18.3	1.06	6.2	1.09	6.7
2	.....	.....	1.50	18.3	1.06	6.2	1.20	8.9
3	.....	.....	1.50	18.3	1.04	5.8	1.20	8.9
4	.....	.....	1.60	22.0	1.04	5.8	1.30	11.4
5	.....	.....	1.40	14.6	1.03	5.7	1.30	11.4
6	.....	.....	1.30	11.4	1.04	5.8	1.30	11.4
7	.....	.....	1.30	11.4	1.03	5.7	1.30	11.4
8	.....	.....	1.20	8.9	1.03	5.7	1.28	10.9
9	.....	.....	1.10	6.8	1.04	5.8	1.34	12.6
10	.....	.....	1.10	6.8	1.05	6.0	1.36	13.2
11	.....	.....	1.10	6.8	1.07	6.3	1.33	12.3
12	.....	.....	1.00	5.2	1.30	11.4	1.30	11.4
13	.....	.....	1.00	5.2	1.71	26.0	1.28	10.9
14	.....	.....	1.00	5.2	1.70	26.0	1.23	9.6
15	1.25*a*	10.0	1.00	5.2	1.70	26.0	1.18	8.5
16	1.20	8.9	1.00	5.2	1.68	25.0	.....	.....
17	1.70	26.0	1.00	5.2	1.60	22.0	.....	.....
18	1.11	7.0	1.00	5.2	1.55	20.0	.....	.....
19	1.10	6.8	1.00	5.2	1.48	17.5	.....	.....
20	1.70	26.0	1.00	5.2	1.41	15.0	.....	.....
21	1.70	26.0	1.00	5.2	1.35	12.9	.....	.....
22	1.50	18.3	1.00	5.2	1.20	8.9	.....	.....
23	1.50	18.3	1.00	5.2	1.12	7.2	.....	.....
24	1.40	14.6	1.00	5.2	1.07	6.3	.....	.....
25	1.40	14.6	1.00	5.2	1.06	6.2	.....	.....
26	1.30	11.4	1.00	5.2	1.15	7.8	.....	.....
27	1.30	11.4	1.00	5.2	1.10	6.8	.....	.....
28	1.00	5.2	1.04	5.8	1.10	6.8	.....	.....
29	1.10	6.8	1.05	6.0	1.08	6.5	.....	.....
30	1.10	6.8	1.07	6.3	1.08	6.5	.....	.....
31	1.30	11.4	.....	.....	1.06	6.2	.....	.....

a Observations commenced.

Monthly Discharge of McGillivray Creek near Coleman, for 1913.

(Drainage area 15 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
August (15-31)	26.0	5.2	13.50	0.900	0.57	455
September	22.0	5.2	8.16	0.544	0.61	486
October	26.0	5.7	10.84	0.723	0.83	664
November (1-15)	13.2	6.7	10.60	0.707	0.39	316
The period	.....	.....	.....	.....	2.40	1,921

CROWSNEST RIVER NEAR COLEMAN.

This station was established July 28, 1910, by H. C. Ritchie. It is located on the S.W. ¼ Sec. 12, Tp. 8, Rge. 5, W. 5th Mer., at a private bridge about two and a half miles west of Coleman.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a tree at the left bank, 150 feet upstream from the bridge. The zero of the gauge (elev. 92.73) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the left bank.

The channel is straight for thirty feet above and 300 feet below the station. Both banks are high, wooded and will not overflow. The bed of the stream is of sand and gravel. The current is fairly swift.



Crowsnest Mountain near Coleman, Alberta.



Source of Crowsnest River, a Branch of Oldman River, near Coleman, Alberta.

Discharge measurements are made from the bridge during high stages; the initial point for soundings being on line with the face of the left abutment. In low stages the stream is waded three quarters of a mile downstream from the bridge.

During 1913, the gauge was read by Prudent LeGal, whose house is about 40 feet from the gauge.

DISCHARGE MEASUREMENTS of Crowsnest River near Coleman, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 9	H. O. Brown	21.5	35.0	0.81	3 98	28
" 28	do	21.5	37.1	0.76	3.70	28
Feb. 13	do	21.0	34.6	0.70	3 21	24
Mar. 1	do	21.0	34.9	0.72	3 34	25
" 28	do	21.0	31.4	0.69	3 96	22
April 9	do	31.3	19.1	1.37	3.18	26
" 30	do	39.3	43.3	2.01	4.26	87
May 17	R. Palmer	31.5	57.6	2.19	4.75	126
June 13	do	36.0	103.0	3.51	7.60	372
July 3	do	33.0	73.8	5.22	6.45	245
" 23	do	29.5	61.3	2.48	5.75	152
Aug. 15	do	46.0	56.6	2.40	5.80	160
" 29	do	43.5	44.4	2.45	5.45	109
Sept. 16	do	42.0	37.6	2.18	5.45	82
" 30	do	40.5	38.1	1.99	5.30	76
Oct. 24	do	43.0	40.3	2.35	5.40	95
Nov. 7	do	39.0	32.5	1.96	5.30	64
" 25	do	40.0	37.5	1.97	5.40	74
Dec. 17	do	39.0	35.8	1.92	5.35	68
" 31	do	38.0	32.0	1.83	5.25	59

DAILY GAUGE HEIGHT AND DISCHARGE of Crowsnest River near Coleman, for 1913. (*Concluded*).

DAY.	January.		Febraury.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.70	*a*32	3.60	26	3.37	25	3.65	24	4.33	95	7.25	337
2	3.75	32	3.60	25	3.10	26	3.25	24	4.32	95	7.25	337
3	3.80	31	3.55	23	3.15	27	3.20	24	4.30	93	7.25	337
4	3.80	31	3.50	23	3.33	27	3.20	24	4.30	93	7.25	337
5	3.80	30	3.97	22	3.21	27	3.20	24	4.30	93	7.05	317
6	3.90	29	3.70	22	3 25	28	3.22	25	4.32	94	7 25	337
7	3.90	29	3.73	22	3.15	28	3.22	27	4.37	98	7.25	337
8	3.98	28	3.93	22	3.21	28	3.25	30	4.40	100	7.25	337
9	3.99	28	3.60	23	3.21	27	3.28	33	4.37	98	7 25	337
10	4.00	28	3.62	23	3.22	27	3.32	35	4.41	101	7.25	337
11	4.03	28	3.60	23	3.25	27	3.40	*a*40	4.47	105	7.40	352
12	4.05	28	3.68	24	3.32	26	3 65	52	4.62	115	7.15	327
13	4.11	27	3.21	24	3.39	26	3.72	56	4.67	119	7.75	387
14	4.12	27	2.25	25	3.45	24	3 76	59	4.73	123	7 70	382
15	4.06	27	2.30	26	3.31	24	3.76	59	4.75	125	7.65	375
16	4.00	27	2.51	26	3.20	25	3.79	60	4 75	125	7.59	367
17	3.95	27	3 05	27	3.83	25	3 92	68	4.78	127	7 50	353
18	3.85	27	3.12	27	4.32	24	4.08	78	4.80	128	7.45	354
19	3.85	26	3 62	26	4.52	23	4 14	82	4.82	129	7 40	348
20	4.45	25	3.58	26	4.02	23	4 22	87	4.82	129	7.34	342
21	4 35	26	3 30	26	3.52	23	4 53	109	4 88	143	7 16	324
22	4.35	26	3.15	25	3.43	23	4.52	108	5 02	144	6 95	302
23	4.15	27	3 12	24	3.35	23	4 52	108	5.36	171	6.80	288
24	4 34	27	3 15	24	3 61	24	4 52	108	5 85	210	6 76	282
25	3.92	28	3.15	23	3.73	23	4 45	104	6.15	235	6 70	276
26	3.95	28	3.52	23	4 12	22	4 48	106	6 35	253	6.75	279
27	3.72	28	3.25	23	4 02	22	4 18	106	6.63	279	7 15	317
28	3.66	28	3 22	24	3 92	22	4 45	104	6 95	307	7.02	302
29	3.66	28	....	....	3 73	22	4 42	101	7.05	317	6 90	290
30	3.63	28	....	....	3.62	23	4 35	97	7.05	317	6 88	288
31	3.62	27	....	....	3.60	23	....	....	7 23	335	....	

a Ice conditions Jan. 1 to Apr. 12.

Daily Gauge Height and Discharge of Crowsnest River near Coleman, for 1913.
(Concluded)

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	6.71	271	5.80	158	5.55	109	5.35	76	5.35	80	5.30	64
2	6.65	265	5.80	158	5.55	109	5.35	76	5.35	79	5.35	68
3	6.45	245	5.80	158	5.70	120	5.35	77	5.33	74	6.50	*a*67
4	6.44	246	5.80	158	5.80	129	5.35	77	5.30	68	6.85	66
5	6.44	242	5.80	158	6.20	160	5.35	78	5.30	67	6.91	65
6	6.45	241	5.75	154	6.05	148	5.35	79	5.30	66	6.93	*a*64
7	6.45	239	5.75	154	5.90	132	5.35	80	5.30	64	5.29	63
8	6.35	229	5.75	154	5.70	115	5.35	81	5.30	64	5.30	64
9	6.31	223	6.25	198	5.55	100	3.35	82	5.30	64	5.25	60
10	6.37	226	6.25	198	5.55	99	5.35	83	5.30	64	5.20	56
11	6.27	218	6.20	195	5.55	98	5.35	84	5.30	64	5.20	56
12	6.27	216	6.10	186	5.55	96	5.35	85	5.30	64	5.20	56
13	6.27	214	5.90	168	5.55	92	5.35	89	5.30	64	5.17	54
14	5.95	184	6.05	182	5.55	88	5.40	100	5.30	64	5.17	54
15	5.92	180	5.80	160	5.55	85	5.55	102	5.55	84	5.15	52
16	5.92	179	5.85	162	5.55	82	5.55	103	5.40	74	5.15	52
17	5.80	166	5.95	167	5.50	80	5.55	103	5.40	74	5.10	49
18	5.80	165	5.85	158	5.50	80	5.50	100	5.45	77	5.10	49
19	5.80	163	5.76	149	5.50	80	5.45	96	5.45	77	5.10	49
20	5.80	162	5.70	143	5.50	80	5.45	97	5.45	77	5.90	*a*55
21	5.70	152	5.65	138	5.45	78	5.45	97	5.45	77	6.20	60
22	5.70	150	5.60	132	5.50	80	5.45	97	5.55	84	6.35	65
23	5.75	152	5.55	126	5.50	80	5.45	97	5.55	84	6.38	65
24	5.75	152	5.55	125	5.50	80	5.40	95	5.40	74	6.07	65
25	5.75	152	5.55	122	5.50	80	5.40	95	5.40	74	6.05	*a*65
26	5.75	152	5.55	120	5.45	78	5.37	89	5.35	68	5.35	68
27	5.65	145	5.55	117	5.40	76	5.37	88	5.30	64	5.29	63
28	5.70	150	5.55	113	5.40	76	5.37	86	5.30	64	5.20	56
29	5.70	150	5.55	109	5.40	76	5.37	84	5.30	64	5.23	59
30	5.75	150	5.55	109	5.40	76	5.35	82	5.30	64	5.25	60
31	5.77	155	5.55	109	.....	.....	5.35	81	.....	.....	5.20	56

a Ice conditions Dec. 3–6 and 20–25.

Monthly Discharge of Crowsnest River near Coleman, for 1913.

(Drainage area 70 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean .	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	32	25	28.0	0.412	0.47	1,722
February	27	22	24.2	0.356	0.37	1,344
March	28	22	24.7	0.363	0.42	1,519
April	109	24	65.0	0.929	1.04	3,868
May	335	93	158.0	2.260	2.61	9,715
June	387	276	329.0	4.700	5.24	19,577
July	271	145	191.0	2.730	3.15	11,744
August	198	109	150.0	2.140	2.47	9,223
September	160	76	95.4	1.360	1.52	5,677
October	103	76	88.4	1.260	1.45	5,436
November	84	61	70.9	1.010	1.13	4,219
December	68	49	59.5	0.850	0.98	3,658
The year	.....	.....	.....	.....	20.85	77,702

SUMMIT CREEK NEAR CROWSNEST.

This station was established by N. Mc. L. Sutherland on April 29, 1912. It is located on the S.W. ¼ Sec. 12, Tp. 8, Rge. 6, W. 5th Mer., and is about a quarter of a mile south of the railway station at Crowsnest, 1000 feet south of the Canadian Pacific Railway concrete dam and 450 feet south of A. Good's dam.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a tree on the right bank of the creek. It is referred to a bench mark on a stump, 18 feet downstream from the gauge; elevation 3.99 feet above the datum of the gauge.

The channel is straight for 15 feet above and 50 feet below the gauge. The right bank is high, heavily timbered and not liable to overflow. The left bank is low, wooded, and liable to overflow. The bed of the stream is of gravel and clear of vegetation. The current is swift.

Discharge measurements are made by wading at the gauge, the initial point for soundings being a post on the left bank. At low stages measurements are made with a weir at a point 15 feet below the gauge.

There is no observer for the gauge at this station.

DISCHARGE MEASUREMENTS of Summit Creek near Crowsnest, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 11	H. O. Brown	3.3	0.75	0 53	1.47	0.40
" 29	do	3.4	0 64	0 57	1.47	0.36
Feb. 14	do	3 4	0 57	0 48	1.44	0.27
Mar. 3	do	3 1	0 51	0 56	1.46	0.30
" 29	do	3.7	0.52	0.35	1.45	0.18
April 10	do	3 6	0.52	0.46	1 46	0.24
" 30	do	10 2	6.48	1 28	2 03	8.30
May 2	do	8.4	5.84	1 21	1 97	7.10
" 19	R. Palmer	11.0	10 00	1.72	2 40	17.20
June 14	do	11 0	5.81	1 49	2 10	8.70
July 4	do	7.6	3.08	0.72	1.84	2.20
" 24	do	6 5	2.16	0.52	1.70	1.12
Aug. 16	do	7 0	2.08	0 54	1.70	1.12
" 30	do	6.0	1.29	0.44	1.59	0.57
Sept. 17	do	6 5	1 09	0.35	1.59	0.38
" 29	do	6.0	1.59	0 30	1.62	0.47
Oct. 22	do	7 5	2 76	0 23	1.78	0.64
Nov. 6	do	7.0	2 27	0 20	1 72	0.45

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Oldman River drainage basin, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
July 23.	R. Palmer	Allison Creek	S.W. 11-8-5-5	15.5	10.80	2.04	22.00
Aug. 15.	do	do	do	15.5	11.00	2.03	22.00
Sept. 16.	do	do	do	15.0	8.20	1.74	14.30
" 30.	do	do	do	15.5	9.40	1.55	14.50
Oct. 24.	do	do	do	15.0	9.30	1.38	12.80
Nov. 7.	do	do	do	15 0	8.20	1.61	13.30
July 22.	do	Bellevue Creek	N.E. 29-7-3-5	3.5	1.13	0.97	1.10
Aug. 11.	R.H.Goodchild.	Creek	S.E. 34-11-29-4				*a*0.76
July 22.	R.Palmer	Drum Creek	N.E.18-7-3-5	11.0	6.10	0 69	4.20
July 8.	R.H.Goodchild.	Dago Creek	S.W. 19-13-2-5				*a*3.20
Oct. 24.	do	do	do				*a*1 94
Sept. 30.	do	Ernst Creek	N.E. 26-10-3-5				*a*0.90
Jan. 8.	H. O. Brown	Fortier S. Spring	S.E. 17-7-1-5				*b*0.003
Jan. 31.	do	do	do				*b*0.327
Feb. 11	H. O. Brown	Fortier S. Spring	S.E. 17-7-1-5				*b*0.0067
" 27.	do	do	do				*b*0.0027
Mar. 27.	do	do	do				*b*0 0031
April 23.	do	do	do				*b*0.0076
Oct. 18.	R.H.Goodchild.	do	do				0.0032
Jan. 8.	H. O. Brown	Fortier N. Spring	do				0.002
" 31.	do	do	do				0.518
Feb. 11	H. O. Brown	Fortier N.Spring	S.E. 17-7-1-5.				*b*0.0022
" 27.	do	do	do				*b*0.0025
Mar. 27.	do	do	do				*b*0.0029
April 23.	do	do	do				*b*0.0050
Oct. 18.	R.H.Goodchild.	do	do				*b*0.0032
Aug. 13.	do	Four Springs	N.W.26-11-30-4				*b*0.110

a Weir measurement.
b Discharge reduced from gallons per 24 hrs.

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Oldman River drainage basin, in 1913.—(*Concluded.*)

Date.	Hydrographer.	Stream.	Location.	Width.	Area of of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
May 3....	W. Turnbull....	Gold Creek.....	S.E. 30-7-3-5....	24.7	18.2	2.80	51.00
July 24....	R. Palmer.....	do	do	24.0	19.8	1.21	24.00
Aug. 16....	do	do	do	24.5	19.8	1.41	28.00
Aug. 30....	do	do	do	24.5	18.7	1.16	22.00
Sept. 17....	do	do	do	24.0	19.1	0.91	17.40
Sept. 29....	do	do	do	24.0	19.0	0.99	18.80
Oct. 23....	do	do	do	25.5	21.0	0.88	18.50
Nov. 6....	do	do	do	24.0	19.3	0.95	18.40
July 14....	R.H.Goodchild..	Jim Creek.....	N.E. 6-15-1-5....	.....	.....	.....	*a*9.70
May 3....	W. Turnbull....	Lyon Creek.....	39-7-4-5.....	19.2	15.8	2.08	32.00
Jan. 9....	H. O. Brown....	Nez-Perc Creek..	N.E. 17-8-4-5....	5.0	1.75	0.82	1.44
Jan. 28....	do	do ..	do ...	2.7	1.03	1.22	1.26
Feb. 13....	do	do ..	do ...	1.9	0.58	1.95	1.13
Mar. 1....	do	do ..	do ...	2.5	0.61	0.98	0.60
" 28....	do	do ..	do ...	2.3	0.62	0.90	0.56
April 19....	H. O. Brown....	Nez-Perc Creek....	N.E. 17-8-4-5....	2.6	0.70	1.28	0.89
April 30....	do	do ..	do ..	13.7	9.80	1.50	14.60
May 17....	R. Palmer.....	do ..	do ..	13.7	11.20	1.90	21.00
June 13....	do	do ..	do ..	13.5	8.40	1.47	12.30
July 3....	do	do ..	do ..	14.2	8.10	0.87	7.10
July 22....	do	do ..	do ..	13.0	7.40	0.68	5.00
Aug. 15....	do	do ..	do ..	14.0	8.60	0.70	6.00
Aug. 29....	do	do ..	do ..	13.0	7.20	0.68	4.90
Sept. 16....	do	do ..	do ..	12.5	6.00	0.66	4.00
Sept. 30....	do	do ..	do ..	13.0	5.90	0.65	3.90
Oct. 24....	do	do ..	do ..	13.0	7.60	0.73	5.60
Nov. 7....	do	do ..	do ..	14.0	8.10	0.71	5.80
Aug. 15....	R.H.Goodchild..	Playle Creek.....	S.W. 32-11-1-5....	.....	.....	.....	*a*0.624
July 10....	R.H.Goodchild..	Spring Creek.....	S.E. 16-14-2-5....	.....	.....	.....	*a*0.144
" 10....	do ..	do	do	.....	.....	.....	*a*0.060
Aug. 13....	do ..	do	N.W.23-11-30-4	.....	.....	.....	*a*0.219
Aug. 15....	do ..	do	S.E. 6-12-1-5.....	.....	.....	.....	*a*0.545
" 15....	do ..	do	S.W. 7-12-1-5.....	.....	.....	.....	*a*0.764
Sept. 12....	do ..	do	N.E. 9-11-28-4....	.....	.....	.....	*a*0.100
" 30....	do ..	do	N.E. 27-10-3-5....	.....	.....	.....	*a*0.103
July 31....	R. Palmer.....	Willow Creek.....	S.W.36-12-28-4..	88.5	142.0	0.99	141.00
Sept. 23....	do	do	do ..	87.0	83.2	0.86	71.00
Oct. 10....	do	do	do ..	89.0	92.0	0.89	82.00
July 23....	do	York Creek.....	S.E. 30-7-3-5....	15.0	11.2	1.76	19.70

a Weir measurement.

WATERTON RIVER DRAINAGE BASIN.

General Description.

Waterton River rises in the northwestern portion of the state of Montana, on the eastern slope of the Rocky Mountains. It flows in a northerly direction and, passing through a chain of lakes near the International Boundary, known as Waterton Lakes, it continues in a north and easterly direction and finally empties into Belly River near Stand Off, Alberta.

The topography of the basin is of a varied character, ranging from the mountainous regions of Montana to the rolling prairie of Southern Alberta. The tributaries are mostly in the upper portion of the basin, near the International Boundary and from the west side.

There is a large snow-fall in the upper portion of the basin, and the melting of this combined with heavy rains often causes big floods on this river in the early summer. Thereafter the river steadily decreases in volume, until the minimum is reached about mid-winter.

Waterton Lakes offer a very favourable site for a storage reservoir, approximately fourteen miles long and one mile wide. The steep rocky banks of the narrows is an ideal site for the construction of a dam. The flow could be more than doubled during the summer months and used for irrigation purposes, or a power project could easily be developed.

WATERTON RIVER AT WATERTON MILLS.

This station was established on August 26, 1908, by P. M. Sauder. It is located on the N.E. ¼ Sec. 8, Tp. 2, Rge. 29, W. 4th Mer., about 250 feet below the river's outlet from the Lower Waterton Lake.

The gauge, which is a plain staff graduated to feet and hundredths, is placed in a stilling box at the right bank. The zero (elev. 90.51) is referred to a permanent iron bench mark (assumed elev. 100.00), situated within six feet of the gauge.

The channel is wide and straight for 250 feet above and 400 feet below the station. Both banks are high, slightly wooded and will not overflow. The bed of the stream is rough and rocky but is not liable to shift. The current is always rather swift at mid-stream.

Discharge measurements are made from a cable car during high stages. In low water the stream can be waded almost across, the deep channel in the middle being taken from the cable car. The measurements are affected frequently by heavy winds. The points for soundings are marked by a tagged wire stretched above the cable.

During 1913 the gauge was read by H. H. Hanson.

DISCHARGE MEASUREMENTS of Waterton River at Waterton Mills, in 1913.

Date.	Hydrographer.	Width	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 8	V. Meek	120.0	125.4	1 15	2 54	144
Feb. 3	G. F. Deas	55.0	68.7	1 46	1 37	100
" 17	do	68.0	66.4	1.64	1.45	109
Mar. 5	do	73.0	76.4	1.55	1 32	119
May 7	F. R. Burfield	286.0	321.0	1.65	3 25	529
" 31	do	303.0	951.0	5.19	5 38	4,933
June 21	do	298.0	694.0	3.57	4.51	2,479
July 15	do	286.0	416.0	2.38	3.62	990
" 30	do	287.0	366.0	2.12	3.48	777
Aug. 18	do	283.0	326.0	1.90	3.38	619
Sept. 5	do	270.0	230.0	1.45	3.03	333
" 30	L. Danielsen	210.0	174.0	1.21	2.75	211
Oct. 24	do	235.0	238.0	1.60	3.10	379
Nov. 29	J. E. Degnan	230.0	233.0	1.16	2.91	270
Dec. 9	do	54.0	74.9	1 56	2 28	117
" 19	do	112.0	124.0	1.25	2.40	154

DAILY GAUGE HEIGHT AND DISCHARGE of Waterton River at Waterton Mills, for 1913.

Day.	January.		Febraury.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.95*b*	122	1.48	112	1.46	111	1.60	114	3.46	733	5.44	5,149
2	1.95	122	1.48	112	1.45	111	1.60	114	3.40	670	5.41	5,041
3	1.93	121	1.37	109	1.43	111	1.59	114	3.36	630	5.39	4,970
4	1.91	120	1.36	109	1.42	110	1.59	114	3.32	590	5.32	4,725
5	2.15*a*	128	1.34	109	1.43*c*	111	1.65	115	3.29	561	5.27	4,556
6	2.35*a*	134	1.28	108	1.31	108	1.71	116	3 30	570	5.19	4,292
7	2.54	144	1 26	107	1.36	109	1.72	116	3.25	525	5.12	4,077
8	2.33	133	1.26	107	1.38	110	1.72	116	3.27	543	5 07	3,926
9	2.27	131	1.26	107	1.36	109	1.72	116	3.28	552	5.13	4,108
10	2.13	127	1.19	106	1.34	109	1.73	117	3.31	580	5.16	4,201
11	2.05	124	1 29	108	1.33	109	1 79	118	3 38	650	5.19	4,294
12	1.93	121	1 29	108	1.33	109	1.88	120	3 44	714	5.10	4,015
13	2.23	130	1 30	108	1.32	108	2.00	123	3.50	780	5.06	3,897
14	2.05	124	1 30	108	1.31	108	2.12	127	3.57	864	4.95	3,580
15	1.93	121	1.32	108	1.29	108	2.24	130	3.65	965	4.87	3,361
16	1.92	121	1 35	109	1.40	110	2 41	136	3.69	1,017	4.73	3,000
17	1.90	120	1.45	111	1.38	110	2 56	146	3.66	978	4 61	2,709
18	1.88	120	1.45	111	1.40	110	2 64	162	3 68	1,004	4 42	2,279
19	1.85	119	1.46	111	1.41	110	2 75	200	3.68	1,004	4 41	2,257
20	1.87	119	1.48	112	1.42	110	3 37	610	3 65	965	4 60	2,685
21	1.80	118	1.52	112	1.44	111	3 50	780	3 67	991	4 51	2,478
22	1.83	119	1 51	112	1.46	111	3 56	852	3 77	1,128	4 43	2,301
23	1.85	119	0.51	112	1.48	112	3 58	876	3 95	1,400	4.37	2,172
24	1.78	118	1.51	112	1 46	111	3 57	864	4 14	1,722	4 33	2,088
25	1.67	115	1.50	112	1.44	111	3 55	840	4.37	2,172	4 29	2,006
26	1.56	113	1.49	112	1.57	113	3 58	876	4 61	2,709	4.41	2,257
27	1.55	113	1.48	112	1.56	113	3 54	828	5 02	3,779	4 51	2,709
28	1.55	113	1.47	111	1 54	113	3.48	758	5 39	4,970	4 65	2,805
29	1.47	111			1.53	113	3.48	758	5.45	5,185	4.69	2,901
30	1.46	111			1.52	112	3.44	114	5.40	5,005	4 58	2,636
31	1.46	111			1.51	112			5 38	4,935		

a Gauge height interpolated.
b–c Discharge estimated from ice conditions curve.

Daily Gauge Height and Discharge of Waterton near Waterton Mills, for 1913.—(*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Dis-Dis-
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.47	2,389	3.45	725	3.09	398	2.75	200	3.10	400	3.07	379
2	4.38	2,193	3.42	692	3.11	408	2.75	200	3.04	358	3.10	400
3	4.30	2,025	3.37	640	3.08	386	2.74	196	3.02	344	3.15	440
4	4.20	1,830	3.36	630	3.06	372	2.73	192	3.00	330	2.97	312
5	4.14	1,722	3.35	620	3.03	351	2.73	192	2.85	245	2.92	282
6	4.08	1,616	3.34	610	3.03	351	2.74	196	2.92	282	3.00	330
7	4.04	1,548	3.32	590	3.02	344	2.91	276	2.82	230	2.70	180
8	3.98	1,448	3.39	660	3.02	344	2.89	265	2.81	225	2.60	160
9	3.94	1,384	3.47	747	3.01	337	2.87	255	2.80	220	2.25	130
10	3.90	1,320	3.52	804	3.00	330	2.86	250	2.82	230	2.36	134
11	3.86	1,260	3.59	888	2.97	312	2.95	300	2.81	225	2.43	136
12	3.81	1,185	3.59	888	2.94	294	3.02	344	2.80	220	2.47	138
13	3.77	1,128	3.59	888	2.92	282	3.10	400	2.80	220	2.48	139
14	3.71	1,044	3.57	876	2.90	270	3.15	440	2.83	235	2.50	140
15	3.62	926	3.46	736	2.87	255	3.23	507	2.82	230	2.43	136
16	3.58	876	3.40	670	2.83	235	3.21	489	2.80	220	2.38	134
17	3.51	792	3.34	610	2.79	216	3.24	516	2.71	184	2.42	136
18	3.47	747	3.38	650	2.80	220	3.22	498	2.77	208	2.38	134
19	3.45	725	3.37	640	2.80	220	3.20	480	2.82	230	2.40	135
20	3.43	703	3.36	630	2.77	208	3.18	464	2.90	270	2.42	136
21	3.42	692	3.34	610	2.76	204	3.17	456	3.04	358	2.45	137
22	3.42	692	3.33	600	2.79	216	3.16	448	3.12	416	2.43	136
23	3.41	681	3.32	590	2.83	235	3.14	432	3.02	344	2.39	135
24	3.41	681	3.29	561	2.80	220	3.10	400	2.91	276	2.36	134
25	3.46	736	3.27	513	2.78	212	3.18	464	2.85	245	2.33	133
26	3.56	852	3.26	534	2.76	204	3.27	543	2.77	208	2.31	132
27	3.55	840	3.22	498	2.75	200	3.27	543	2.67	171	2.29	132
28	3.52	804	3.16	448	2.74	196	3.25	525	2.87	255	2.28	131
29	3.50	780	3.12	416	2.72	188	3.23	507	3.00	330	2.27	131
30	3.48	758	3.07	379	2.75	200	3.20	480	2.93	288	2.25	130
31	3.48	758	3.10	400	.....	.....	3.15	440	.....	.....	2.24	130

Monthly Discharge of Waterton River at Waterton Mills, for 1913.

(Drainage area 214 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	144	111	121	0.565	0.767	7,440
February	112	106	110	0.514	0.535	6,104
March	113	108	110	0.514	0.593	6,764
April	876	114	373	1.740	1.940	22,195
May	5,185	525	1,577	7.370	8.500	96,966
June	5,149	2,006	3,383	15.800	17.600	201,301
July	2,389	681	1,133	5.290	6.100	69,665
August	883	379	638	2.980	3.440	39,229
September	408	188	273	1.280	1.430	16,245
October	543	192	384	1.790	2.060	23,611
November	416	171	267	1.250	1.400	15,888
December	440	130	179	0.836	0.960	11,006
The year	.....	.....	.....	.....	45.32	516,419

CROOKED CREEK NEAR WATERTON MILLS.

This station was established September 15, 1909, by H. C. Ritchie. It was at first located on the S.E. ¼ Sec. 22, Tp. 2, Rge. 29, W. 4th Mer., but as, an observer could not be secured at this point, it was moved on June 15, 1911, by L. J. Gleeson to a point 250 feet from Ernest Allred's house on the S.W. ¼ Sec. 23, Tp. 2, Rge. 29, W. 4th Mer. It was again moved on October 15, 1912, by G. F. Deas to the S.W. ¼ Sec. 22, Tp. 2, Rge. 29, W 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is securely fastened to the right bank. The zero of the gauge (elev. 89.48) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank 25 feet from the gauge. The old bench mark is at elevation 101.58 referred to the present system of levels.

The stream flows in one channel at all stages. It is straight for 50 feet above and 100 feet below the station. The right bank is clean and not liable to overflow. The left bank is covered with brush and may overflow in extreme high water.

Discharge measurements are made by wading, 30 feet downstream from the gauge. The initial point for soundings is at a stump of a small tree on the left bank. During flood periods the stream cannot be waded at this point but gaugings can be made at a bridge about 1 ½ miles downstream.

This stream is subject to sudden rises in stage due to rains and it is probable that the figures for the total run-off are slighly lower than they should be.

During 1913, the gauge was read by Frank Rowe.

Discharge Measurements of Crooked Creek near Waterton Mills, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. persec.*	*Feet.*	*Sec.-ft.*
May 8	F. R. Burfield	17	18.6	1.41	2.21	26.4
June 1	do	12	23.1	2.03	2.44	46.9
" 20	do	16	18.6	1.12	2.08	20.9
July 16	G. H. Whyte	17	13.3	0.70	1.80	9.3
Aug. 2	F. R. Burfield	15	12.0	0.68	1.75	8.2
" 16	do	16	13.0	0.85	1.83	11.0
Oct. 1	L. Danielsen	15	9.3	0.40	1.60	3.8
" 24	do	16	12.0	0.74	1.78	8.9

Daily Gauge Height and Discharge of Crooked Creek near Waterton Mills, for 1913.

Day.	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	2 44	47.0	2.30	35 0	1.77	8.7	1.70	6.7	1.60	3.9
2	.....	.....	2.43	46 0	2.18	27.0	1.75	8.1	1 68	6.1	1.58	3.3
3	.....	.....	2.38	42 0	2.10	22.0	1.73	7.5	1.65	5 3	1.60	3.9
4	2.27	*a*33	2 32	37.0	2.07	20.0	1.73	7.5	1.67	5 9	1.67	5.9
5	2.26	32	2.30	35.0	2.05	19.5	1.72	7.3	1.63	4.7	1.72	7.3
6	2.24	31	2.30	35.0	2.01	17.5	1.69	6 4	1 63	4.7	1.80	9.5
7	2.28	33	2.28	33.0	1.93	14.2	1.66	5.6	1.63	4.7	1.82	10.1
8	2.21	29	2 24	31.0	1 90	13.0	1.81	9.8	1.63	4 7	1.85	11.0
9	2.32	37	2.23	30 0	1.89	12 6	2.03	18.5	1 62	4 5	1.76	8.4
10	2.29	34	2 21	29.0	1.88	12.2	2.45	48.0	1.61	4.2	1.67	5.9
11	2.28	33	2.21	29 0	1.90	13.0	2.21	29 0	1.60	3 9	1.72	7.3
12	2.28	33	2.20	28.0	1.87	11.8	2.00	17.0	1.60	3 9	1.88	12.2
13	2.27	33	2 23	30.0	1.85	11.0	1.95	15.0	1.58	3.3	1.93	14.2
14	2.24	31	2 19	28.0	1 84	10 7	1.91	13.4	1 58	3 3	2.19	28.0
15	2.23	30	2 14	24.0	1 84	10 7	1.85	11 0	1 58	3 3	2 04	19.0
16	2.24	31	2.10	22.0	1 80	9 5	1 83	10.4	1 56	2 8	1.97	15.8
17	2.27	33	2.08	21.0	1.78	8 9	1 83	10.4	1 56	2.8	1.90	13.0
18	2,74	84	2,06	20 0	1 76	8 4	1 84	10 7	1 56	2 8	1.80	9.5
19	2.72	81	2'03	18.5	1 74	7.8	1.79	9 2	1 58	3 3	1.89	12.6
20	2.55	59	2 08	21.0	1.73	7.5	1 75	8.1	1 58	3 3	1.82	10.1
21	2.47	50	2 07	20 0	1 74	7.8	1.72	7 3	1 58	3 3	1.87	11.8
22	2.38	42	2 01	17 5	1.73	7.5	1.70	6.7	1.69	6.1	1.87	11.8
23	2.31	36	2 00	17 0	1.73	7 5	1.67	5 9	1 71	7 0	1.86	11.4
24	2.37	41	1 96	15 4	1.73	7 5	1.65	5 3	1 72	7 3	1.78	8.9
25	2.41	44	1 94	14.6	1.71	7.0	1.63	4.7	1.72	7.3	1.77	8.7
26	2.43	46	2 19	28 0	2 34	38 0	1 63	4.7	1.67	5 9	1.77	8.7
27	2.48	51	3 00	120 0	2.03	18 5	1.63	4.7	1.63	4.7	1.80	9.5
28	2.53	56	3 05	127.0	1.90	13.0	1.63	4.7	1.60	3 9	1.80	9.5
29	2.55	59	2 65	71 0	2 00	17 0	1 62	4.5	1.60	3 9	1.78	8.9
30	2.53	56	2 36	40 0	1 95	15 0	1 65	5 3	1.58	3 3	1 82	10.1
31	2.47	50	...	.	1.84	10 7	1.64	5 0	.....		1 81	10.7

a Observations commenced.

Monthly Discharge of Crooked Creek near Waterton Mills for 1913.

(Drainage area 20 square miles).

Month.	Discharge in Second-Feet.				Run Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (4-31)	84.0	29.0	43.10	2.160	2.250	2,394
June	127.0	14.6	35.90	1.800	2.010	2,136
July	38.0	7.0	14.30	0.715	0.824	879
August	48.0	4.7	10.30	0.515	0.594	633
September	7.3	2.8	4.50	0.228	0.255	272
October	28.0	3.3	10.40	0.520	0.600	640
The period	.....	.....	.....	.....	6.533	6,954

Miscellaneous Discharge Measurements of Waterton River drainage basin, in 1913

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. fee .*	*Feet per sec.*	*Sec.-ft.*
July 31	F. R. Burfield	Blakiston Brook	N.E. 30-1-29-4	33.5	38.0	2.50	95.0
Aug. 18	do	do	do	35.0	40.0	2.11	85.0
Sept. 5	do	do	do	28.0	34.0	1.42	49.0
Aug. 20	do	Cottonwood Creek	S.W.21-2-29-4	17.5	10.8	0.79	8.4
" 20	do	Drywood Creek	N.W.18-4-29-4	27.0	25.6	1.51	39.0
" 21	do	Foothill Creek	N.E. 29-4-29-4	.....	.....	.....	0.005
Aug. 1	do	Oil Creek	S.W. 23-1-30-4	45.0	46.0	1.59	73.0
" 19	do	do	do	44.0	36.8	1.54	57.0
Sept. 6	do	do	do	43.0	39.0	1.47	58.0
Aug. 20	do	Pine Creek	N.W.21-3-29-4	16.5	7.8	1.98	15.5
" 20	do	Yarrow Creek	S.E. 18-4-29-4	38.0	30.0	1.47	44.0

BELLY RIVER DRAINAGE RIVER BASIN.

General Description.

Belly River rises near Chief Mountain in northern Montana. The main stream is augmented on the United States side of the boundary line by Middle Fork and on the Canadian side by North Fork. From the junction with North Fork on Sec. 21, Tp. 1, Rge. 28, W. 4th Mer., the river flows in a winding, but northeasterly course until it is joined by Oldman River in Sec. 27, Tp. 9, Rge. 23, W. 4th Mer., where it turns southeasterly, and after making a loop flows in a north and easterly direction until it joins Bow River in Sec. 27, Tp. 11, Rge. 13, W. 4th Mer., and forms the South Saskatchewan River.

The topography of the basin is of the most varied character, ranging from the mountainous regions of Montana and the rolling prairie and foothills at the boundary to the level prairie which extends from Lethbridge to the junction with the Bow River. The upper tributaries drain a forested region; the main stream flows through a deep valley with many clumps of large whitewood on its banks.

There is an abundant snowfall in the upper portion of the basin, but the precipitation diminishes into semi-arid conditions near Lethbridge. At first Belly River is a comparatively clear stream but soon after crossing the boundary line it gradually becomes turbid, especially at the times of high water. The greater portion of the sediment is caused by the washing away of banks and cutting of new channels. Freshets caused by melting snow and heavy rains are frequent in the summer. The maximum flow usually occurs in June or July and after that the flow gradually decreases until it reaches the minimum in January or February.

As yet very little use has been made of the water in this basin. In the upper regions, where water could easily be diverted, it is not required for irrigation purposes and farther downstream it would be an expensive undertaking.

There are a couple of small private irrigation schemes diverting water from this river, and the city of Lethbridge receives its domestic supply from the same source.

The Canadian Pacific Railway Company have located and may construct a canal from Belly River to supply their irrigation system, if St. Mary River is found deficient. A survey and estimate of the cost of this proposed canal were made by the Government during 1912, and a copy of the report may be seen in the report of the Commissioner of Irrigation for 1912. There are also a number of feasible power sites in the upper regions which will no doubt be developed when there is a market.

BELLY RIVER NEAR MOUNTAIN VIEW.

This station was established on November 1, 1911, by H. R. Carscallen. It is situated in the N.E. ¼ Sec. 5, Tp. 2, Rge. 28, W. 4th Mer., and is six miles southwest of Mountain View P. O.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to a post sunk in the bed of the stream at the right bank. The zero (elev. 88.16) is referred to a permanent iron bench mark (assumed elev. 100.00), situated beneath the centre of the cable support on the right bank.

The channel is straight for 250 feet above the station and for 350 feet below. The bed is composed of gravel and sand. The right bank is high, slightly wooded, and will not overflow except during extreme high water. The left bank is low, quite well wooded, and will overflow.

Discharge measurements are made from a cable car, by means of a current meter and stay wire. The initial point for soundings is a spike driven into the downstream cable support on the left bank, and the points for soundings are marked by red paint on a measuring wire.

During 1913, the gauge was read by J. N. West.

DISCHARGE MEASUREMENTS of Belly River near Mountain View, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 9	V. Meek	47	41.4	1.56	1.88	64.4
Feb. 4	G. F. Deas	40	44.4	1.63	2.05	72.0
" 18	do	40	31.2	1.29	1.98	40.2
Mar. 6	do	40	25.3	1.45	1.87	37.1
May 9	F. R. Burfield	84	218.0	1.12	2.18	244.0
" 30	do	105	461.0	4.13	4.52	1906.0
June 2	do	105	488.0	3.96	4.53	1929.0
" 19	do	99	350.0	2.88	3.48	1006.0
July 14	G. H. Whyte	93	292.0	1.85	2.85	541.0
" 29	F. R. Burfield	92	277.0	1.91	2.84	528.0
Aug. 15	do	93	272.0	1.69	2.76	460.0
Sept. 4	do	88	241.0	1.16	2.39	279.0
Oct. 2	L. Danielsen	85	212.0	0.76	2.02	162.0
" 23	do	87	216.0	0.84	2.18	182.0

Daily Gauge Height and Discharge of Belly River near Mountain View, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.00*a*	69	2.02	78	.....	34	2.15	81	2.33	253	4.49	1,891
2	1.96	68	2.03	77	.....	34	2.05	84	2.30	242	4.53	1,927
3	1.90	67	2.01	75	.....	35	2.00	86	2.28	236	4.49	1,891
4	1.86	67	1.92	72	.....	36	1.95	87	2.25	226	4.39	1,801
5	1.55	67	1.93	68	.....	37	1.99	87	2.20	202	4.29	1,711
6	1.65	66	1.90	64	1.72	37	2.03	87	2.20	202	4.24	1,666
7	2.10	65	1.87	59	.....	37	1.99	87	2.19	199	4.09	1,531
8	2.00	65	1.92	59	1.78	39	1.95	89	2.10	177	4.11	1,549
9	1.97	65	1.93	59	.....	42	1.98	91	2.18	197	4.23	1,657
10	2.10	65	.....	60	1.75	48	1.90	*b*110	2.42	289	4.29	1,711
11	2.00	64	.....	59	.....	58	1.97	149	2.44	298	4.39	1,801
12	2.18	63	.....	61	1.80	61	2.04	164	2.52	336	4.22	1,648
13	2.15	63	.....	63	.....	61	2.00	156	2.65	407	4.09	1,531
14	2.15	62	.....	62	1.85	61	2.15	189	2.69	430	4.00	1,450
15	2.17	61	.....	58	.....	60	2.21	205	2.70	436	3.84	1,308
16	2.20	58	.....	52	1.75	58	2.28	236	2.72	448	3.63	1,127
17	2.15	56	.....	47	.....	57	2.35	260	2.68	424	3.49	1,013
18	2.10	56	1.76	41	.....	55	2.35	260	2.77	479	3.45	982
19	2.10	56	.....	39	1.65	54	2.35	260	2.76	472	3.58	1,045
20	2.15	56	.....	39	.....	54	2.40	280	2.72	448	3.77	1,247
21	1.85	58	.....	40	1.60	54	2.53	342	2.72	448	3.64	1,136
22	1.78	61	.....	40	.....	57	2.55	352	2.87	546	3.47	998
23	1.60	64	.....	39	1.75	57	2.53	342	3.22	805	3.41	951
24	1.65	68	.....	39	.....	57	2.50	326	3.46	890	3.49	1,013
25	1.60	72	.....	38	1.76	57	2.77	479	3.62	1,119	3.54	1,053
26	1.65	75	.....	36	.....	58	3.03	662	3.92	1,379	3.69	1,178
27	1.65	77	.....	35	2.00	60	2.71	442	4.32	1,738	4.24	1,666
28	1.85	78	.....	34	.....	62	2.40	280	4.62	2,008	4.14	1,576
29	2.00	79	.....	.....	.....	67	2.38	272	4.62	2,008	4.04	1,486
30	2.00	79	.....	.....	1.85	72	2.35	260	4.45	1,855	3.84	1,308
31	2.01	78	.....	.....	.....	77	.....	.....	4.49	1,891	.....	.....

a–b Ice conditions, discharges estimated.

DAILY GAUGE HEIGHT AND DISCHARGE of Belly River near Mountain View, for 1913.
(*Concluded*).

DAY.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.64	1,136	2.66	413	2.36	264	2.05	166	1.99	154	1.84	*a*137
2	3.57	1,077	2.68	424	2.29	239	2.07	170	2.02	160	1.78	129
3	3.44	974	2.71	442	2.26	229	2.11	179	1.99	154	1.76	121
4	3.30	866	2.71	442	2.39	276	2.10	177	2.04	164	1.78	113
5	3.24	820	2.71	442	2.35	260	2.12	182	2.04	164	1.84	105
6	3.22	805	2 68	424	2.30	242	2.13	184	2.02	160	1.94	97
7	3 20	790	2.65	407	2.30	242	2.00	156	1.99	154	1.94	89
8	3.19	782	2.65	407	2.30	242	2.07	170	1.99	154	2.14	81
9	3.18	775	3.16	760	2.25	226	2.06	168	1 99	154	2.14	78
10	3.19	782	3.06	685	2.25	226	2.04	164	2.01	158	1.79	76
11	3.20	790	2.94	597	2.25	226	2.20	202	2.04	164	1.73	75
12	3.14	745	2.85	532	2.15	189	2.30	242	2.05	166	1.73	74
13	3.04	671	2.76	472	2.15	189	2.50	326	2.05	166	1.79	73
14	2.85	532	2.71	442	2.10	177	2.53	342	2.04	164	1.79	72
15	2.75	466	2.69	430	2.10	177	2.47	312	2.04	164	1.94	71
16	2.64	401	2.69	430	2.10	177	2.42	289	2.05	166	1.94	70
17	2.64	401	2.66	413	2.07	170	2.38	272	2.05	166	1.89	69
18	2.71	442	2.55	352	2 05	166	2 30	242	2 05	166	1.89	68
19	2.65	407	2.46	307	2.05	166	2 24	223	2 05	166	1.69	67
20	2.69	430	2.39	276	2.05	166	2.21	205	2.05	166	1.69	66
21	2.71	442	2.36	264	2.02	160	2.18	197	2.07	170	1.94	72
22	2.78	485	2.36	264	2 00	156	2 15	189	2.07	170	1.94	72
23	2.77	479	2.36	264	2.00	156	2.18	197	2 05	166	1.95	75
24	2.75	466	2.41	284	2.00	156	2.17	194	2 04	161	1.94	74
25	2.76	472	2.41	284	2.00	156	2.18	197	1.99	154	2.04	80
26	3 01	648	2.41	284	2.00	156	2.20	202	1.94	145	2.04	80
27	2 97	619	2.41	284	2.00	156	2.18	197	1.94	145	2.14	87
28	2.76	472	2.41	284	2.00	156	2.15	189	1.95	147	2.14	87
29	2.81	505	2.41	284	2.00	156	2.14	187	1.94	145	2.14	87
30	2.77	479	2.39	276	2.01	158	2.10	177	1.94	145	2.12	85
31	2.71	442	2.36	264	.....	.....	2.08	173	.....	.....	2.13	*b*84

a-b Ice conditions discharges estimated.

MONTHLY DISCHARGE of Belly River near Mountain View, for 1913.
(Drainage area 118 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	79	56	66.1	0.569	0.646	4,064
February	78	34	53.3	0.451	0.470	2,960
March	77	34	52.8	0.447	0.515	3,246
April	662	81	227.0	1.920	2.142	13,507
May	2,008	177	680.0	5.760	6.640	42,812
June	1,927	951	1,428.0	12.100	13.500	84,972
July	1,136	401	632.0	5.360	6.180	38,860
August	760	264	392.0	3.320	3.830	24,103
September	276	156	194.0	1.640	1.830	11,544
October	342	156	209.0	1.770	2.010	12,851
November	170	145	159.0	1.350	1.510	9,461
December	137	66	84.0	0.712	0.821	5,165
The year					40.124	252,545

MAMI CREEK NEAR MOUNTAIN VIEW.

This station was established on August 13, 1909, by H. C. Ritchie. It is located at the traffic bridge on the road allowance south of the S.E. ¼ Sec. 19, Tp. 2, Rge. 27, W. 4th Mer., and is just below the junction of the east and west branches.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to a pile supporting the bridge at the left bank. The zero (elev. 93.06) is referred to a permanent iron bench mark (assumed elev. 100.00) located close to the east bank about 20 feet north of the bridge.

The channel is curved for about 100 feet above the bridge and straight for 200 feet below. Both banks are high, clear of brush, rocky and liable to overflow in extreme high water. The bed of the stream is composed of stones covered with sand and gravel.

Discharge measurements are made during high water from the bridge. In low water the east branch dries up and the west branch is waded just below the junction.

During 1913, the gauge was read by Chas. H. Findlay of Mountain View.

Discharge Measurements of Mami Creek near Mountain View in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 8	F. R. Burfield	24.5	31.1	0.78	2.46	24.20
" 30	do	19.0	29.8	0.76	2.48	22.60
June 19	do	12.5	5.2	1.03	2.15	5.30
July 15	do	12.0	4.5	0.88	2.09	3.85
" 29	do	12.0	4.7	1.02	2.13	4.75
Aug. 14	do	10.5	3.8	0.87	2.06	3.26
Sept. 4	do	9.0	2.3	0.70	1.94	1.60
Oct. 1	L. Danielsen	8.5	2.6	0.49	1.82	1.24
" 22	do	10.0	3.0	0.75	2.02	2.24

Daily Gauge Heigth and Discharge of Mami River near Mountain View, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	2.30	12 0	2.23	8.6
2	.....	.....	2.30	12.0	2.20	7.2
3	.....	.....	2.30	12.0	2.19	6.8
4	.....	.....	2.30	12.0	2.19	6.8
5	.....	.....	2.30	12.0	2.18	6.4
6	.....	.....	2.30	12.0	2.17	6.1
7	.....	.....	2.30	12.0	2.16	5.7
8	.....	.....	2.30	12.0	2.14	5.0
9	.....	.....	2.30	12.0	2.12	4.5
10	.....	.....	2.30	12.0	2 11	4.3
11	.....	.....	2.30	12.0	2.11	4.3
12	.....	.....	2.30	12.0	2.10	4.0
13	.....	.....	2.30	12.0	2.10	4.0
14	.....	.....	2.30	12.0	2.09	3.8
15	a 2.70	37	2.30	12.0	2.06	3.8
16	2 70	37	2.30	12.0	2 02	2.7
17	2.50	24	2.39	17 0	2.01	2.5
18	2 50	24	2.45	21.0	2.00	2.4
19	2 70	37	2.50	24 0	1 96	2.0
20	2.70	37	2.60	30.0	1.99	2.3
21	2 70	37	2.51	25 0	2 00	2.4
22	2.50	24	2.50	24.0	1 99	2.3
23	2.50	24	2.48	23 0	1 98	2.2
24	2.50	24	2.45	21 0	1 98	2.2
25	2.50	24	2.42	18.9	1 97	2.1
26	2 30	12	2.40	18.0	2 22	8.1
27	2.30	12	2.40	18 0	2.30	12.0
28	2.30	12	2.39	17.0	2.30	12.0
29	2.30	12	2.38	16.4	2.28	11.0
30	2.30	12	2.30	12.0	2.25	9.5
31	.....	.....	2.27	10.5	.....	.....

a No gauge height observations until April 15.

Daily Gauge Height and Discharge of Mami Creek near Mountain View, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.20	7.20	1.74	1.74	1.79	1.96	1.75	0.80
2	2.14	5.00	1.50	1.50	1.79	1.96	1.75	0.80
3	2.10	4.00	1.32	1.32	1.79	1.96	1.75	0.80
4	2.10	4.00	1.20	1.20	1.77	1.89	1.75	0.80
5	2.08	3.60	1.16	1.16	1.77	1.89	1.84	1.16
6	2.05	3.10	1.20	1.20	1.76	0.84	1.84	1.16
7	2.01	2.50	1.16	1.16	1.76	0.84	1.85	1.20
8	1.99	2.30	4.00	4.00	1.75	0.80	1.86	1.26
9	1.98	2.20	2.40	2.40	1.75	0.80	1.88	1.38
10	1.98	2.20	2.40	2.40	1.75	0.80	1.88	1.38
11	1.99	2.30	2.20	2.20	1.75	0.80	1.88	1.38
12	1.98	2.20	2.00	2.00	1.75	0.80	1.90	1.50
13	1.97	2.10	1.82	1.82	1.75	0.80	1.91	1.58
14	1.95	1.90	1.44	1.44	1.75	0.80	1.92	1.66
15	1.91	1.58	1.16	1.16	1.75	0.80	1.92	1.66
16	1.90	1.50	1.20	1.20	1.75	0.80	1.90	1.50
17	1.89	1.44	1.20	1.20	1.75	0.80	1.88	1.38
18	1.87	1.32	1.20	1.20	1.75	0.80	1.86	1.26
19	1.86	1.26	1.16	1.16	1.75	0.80	1.88	1.38
20	1.85	1.20	1.16	1.16	1.75	0.80	1.91	1.58
21	1.85	1.20	1.12	1.12	1.75	0.80	1.94	1.82
22	1.85	1.20	1.08	1.08	1.85	1.20	1.85	1.20
23	1.86	1.26	1.08	1.08	1.84	1.16	1.85	1.20
24	1.87	1.32	1.04	1.04	1.80	1.00	1.84	1.16
25	1.87	1.32	1.00	1.00	1.80	1.00	1.84	1.16
26	1.98	2.20	1.00	1.00	1.80	0.92	1.85	1.20
27	1.95	1.90	1.96	1.96	1.80	0.80	1.85	1.20
28	1.93	1.74	1.96	1.96	1.78	0.92	1.87	1.32
29	1.96	2.00	1.96	1.96	1.75	0.80	1.87	1.32
30	1.96	2.00	1.00	1.00	1.75	0.80	1.89	1.44
31	1.95	1.90	1.00	1.00	.....	.....	1.91	1.58

Monthly Discharge of Mami Creek at Mountain View, for 1913.

(Drainage area 21 square miles.)

Month.	Discharge in Second-Feet.				Run-Off	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (15-30)	37.00	12.00	24.30	1.160	0.688	797
May	30.00	10.50	15.70	0.748	0.863	965
June	12.00	2.00	5.23	0.249	0.278	311
July	7.20	1.20	2.29	0.109	0.126	141
August	4.00	1.00	1.51	0.072	0.083	93
September	1.96	0.80	1.05	0.050	0.056	62
October	1.82	0.80	1.30	0.062	0.071	80
The period	.....	.....	.....	.....	2.165	2,449

CHRISTIANSON DITCH NEAR MOUNTAIN VIEW.

This station was established on September 14, 1911, by L. J. Gleeson. It is situated in the S.E. ¼ Sec. 12, Tp. 3, Rge. 28, W. 4th Mer., on Elias Christianson's irrigation ditch. It is six miles northwest of Mountain View and one quarter of a mile south of Big Bend police post.

The gauge, which is a plain staff graduated to feet and tenths, is driven into the channel of the ditch on the line of the gauging section. The zero of the gauge (elev. 97.10) is referred to a bench mark (assumed elev. 100.00), situated on the left bank close to the gauge.

The channel is straight for 300 feet above and 100 feet below the station. The main ditch is about 400 feet long and 4 feet wide, and has a good fall.

During 1913, the gauge was read by Mrs. Christianson.

DISCHARGE MEASUREMENTS of Christianson Ditch, near Mountain View, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 20	F. R. Burfield	5.7	2.90	0.31	1.47	0.89
Aug. 16	do	.....	.....	.....	1.17	*a*0.10
" 16	do	.....	.....	.....	1.33	*a*0.18

a Weir measurement.

DAILY GAUGE HEIGHT AND DISCHARGE of Christianson Ditch near Mountain View, for 1913.

Day.	May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.08	0.03	1.42	ac 0.58
2	.....	.....	1.08	0.03	.....	.....
3	.....	.....	1.08	0.03	.....	.....
4	.....	.....	1.33	0.28	.....	.....
5	.....	.....	1.17	0.07	.....	.....
6	.....	.....	1.17	0.07	.....	.....
7	.....	.....	1.17	0.07	.....	.....
8	.....	.....	1.17	0.07	.....	.....
9	.....	.....	1.17	0.07	.....	.....
10	.....	.....	1.25	0.14	.....	.....
11	.....	.....	1.25	0.14	.....	.....
12	.....	.....	1.58	2.50	.....	.....
13	.....	.....	1.58	2.50	.....	.....
14	.....	.....	1.58	2.50	.....	.....
15	.....	.....	1.42	0.58	.....	.....
16	.....	.....	1.25	0.14	.....	.....
17	1.08	b 0.03	1.25	0.14	.....	.....
18	1.08	c 0.03	1.25	0.14	.....	.....
19	.....	.....	1.25	0.14	.....	.....
20	.....	.....	1.25	0.14	.....	.....
21	.....	.....	1.42	0.58	.....	.....
22	.....	.....	1.42	0.58	.....	.....
23	.....	.....	1.42	0.58	.....	.....
24	.....	.....	1.42	0.58	.....	.....
25	.....	.....	1.25	0.14	.....	.....
26	.....	.....	1.33	0.28	.....	.....
27	.....	.....	1.66	3.78	.....	.....
28	.....	.....	1.42	0.58	.....	.....
29	.....	.....	1.42	0.58	.....	.....
30	.....	.....	1.42	0.58	.....	.....
31	1.08	b 0.03	.....	.....	.....	.....

a Gauge height interpolated.
b Ditch headgate opened.
c Ditch headgate closed.

MONTHLY DISCHARGE of Christianson Ditch near Mountain View, for 1913.

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (17-18 and 31)	0.03	0.03	0.030			0.2
June	3.78	0.03	0.601			36.0
July (1-2)	0.58	0.58	0.580			1.0
The period						37.2

BELLY RIVER NEAR STAND OFF.

This station was established on May 27, 1909, by H. C. Ritchie. It is eighteen miles south of the town of Macleod, and is located on the S.E. ¼ Sec. 21, Tp. 6, Rge. 25, W. 4th Mer., 200 yards from George Pearson's house.

The gauge, which is of the standard chain type, is situated on the left bank about 200 yards from George Pearson's house. The gauge is graduated to feet and hundredths and is laid on two posts, sunk in the bank. The zero (elev. 91.82) is referred to a permanent iron bench mark(assumed elev. 100.00) near by.

For a distance of 75 feet above and 60 feet below the gauge, the channel is straight. The current runs smoothly with a moderate velocity over a bed of clean gravel. Both banks are low, free from brush, and liable to overflow during high stages of the river. Since the establishment of this station the cross-section has changed very little, if any, but owing to the sharp turns in the channel the river is liable to take a new course altogether in times of extreme flood.

Discharge measurements are made during the open season from the traffic bridge on the N.E. ¼ Sec. 21, Tp. 6, Rge. 25, W. 4th Mer., one mile upstream from the gauge. The points for soundings are painted on the lower chord of the superstructure. The initial point is at the left approach. During the frozen period measurements are made at or near the gauge.

During 1913, the gauge was read by George Pearson.

DISCHARGE MEASUREMENTS of Belly River near Stand Off, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 3	H. O. Brown	26.0	30.8	2.14	6.98	66
" 24	do	74.0	65.1	0.71	7.75	46
Feb. 7	do	26.0	30.7	1.96	8.00	59
" 24	do	70.0	86.0	0.70	8.16	70
Mar. 13	do	75.0	97.5	0.93	8.16	92
Apr. 11	do	90.3	222.0	2.62	2.29	584
May 12	F. R. Burfield	82.0	188.0	2.53	2.04	477
June 16	do	88.0	298.0	3.88	3.03	1,154
July 16	W. A. Burton	81.7	218.0	2.63	2.22	573
Aug. 5	F. R. Burfield	82.0	198.0	2.46	2.16	487
" 21	do	82.0	167.0	1.93	1.89	323
Sept. 27	L. Danielsen	84.0	126.0	1.15	1.66	147
Nov. 1	do	86.0	136.0	1.44	1.56	195
Oct. 17	do	86.0	178.0	1.78	1.82	318
Nov. 21	R. Palmer	83.0	111.0	1.16	1.60	129
Dec. 8	do	81.0	118.0	1.05	1.32	124

Daily Gauge Height and Discharge of Belly River near Stand Off, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.98	*b*68	3.75	65	3.70	64	5.20	93	1.98	402	3.84	1,834
2	3.03	67	3.80	61	3.75	65	5.44	96	1.95	382	3.80	1,800
3	3.01	66	3.80	58	3.80	67	5.33	98	2.00	415	3.74	1,750
4	3.10	63	3.90	58	3.90	70	5.08	100	1.95	382	3.68	1,699
5	3.10	60	3.90	58	3.95	74	4.93	102	1.90	349	3.62	1,649
6	3.10	60	3.90	58	4.10	80	4.78	106	1.85	317	3.56	1,598
7	3.30	60	3.90	59	4.30	88	4.75	108	1.88	336	3.49	1,540
8	3.40	58	3.90	59	4.60	93	4.76	111	1.88	336	3.44	1,498
9	3.45	56	3.90	61	4.65	95	4.56	200	1.95	382	3.79	1,792
10	3.48	55	3.90	64	.....*a*	96	2.07	*c*461	1.98	402	3.74	1,750
11	3.55	55	3.90	66	.....*a*	95	2.28	602	2.05	448	3.68	1,699
12	3.70	60	3.90	70	.....*a*	94	2.25	582	2.04	441	3.61	1,640
13	3.72	60	3.90	72	4.16	92	2.22	562	2.06	455	3.46	1,514
14	3.80	60	3.95	73	4.16	88	2.32	630	2.19	541	3.36	1,430
15	3.85	55	3.95	74	4.19	86	2.32	630	2.21	555	3.29	1,372
16	3.90	52	.....*a*	75	4.71	82	2.25	582	2.33	636	3.03	1,154
17	4.10	48	.....	75	4.53	78	2.19	541	2.43	706	2.87	1,026
18	4.10	45	.....	75	4.71	75	2.19	541	2.43	706	2.83	995
19	4.10	44	.....	75	4.73	73	2.25	582	2.19	541	2.92	1,065
20	3.90	44	.....	74	4.78	71	2.30	616	2.49	748	3.02	1,145
21	3.75	44	.....	73	4.18	70	2.39	678	2.49	748	2.97	1,105
22	3.73	44	.....	72	4.06	70	2.35	650	2.56	797	2.92	1,065
23	3.90	45	.....*a*	71	4.03	70	2.33	636	2.56	797	2.83	995
24	3.70	46	4.16	70	4.08	72	2.25	582	2.87	1,026	2.77	950
25	3.65	51	4.15	68	4.08	75	2.15	574	2.90	1,049	2.72	913
26	3.65	56	4.10	66	4.10	78	2.09	474	2.99	1,121	2.62	840
27	3.70	61	4.00	65	4.17	83	2.15	514	3.59	1,624	3.02	1,145
28	3.75	65	3.85	64	4.20	86	2.10	481	4.29	2,212	3.62	1,649
29	3.75	67	.....	.....	4.44	88	2.05	448	4.49	2,380	3.57	1,687
30	3.70	68	.....	.....	4.45	90	2.03	435	3.99	1,960	3.35	1,422
31	3.90	67	.....	.....	4.76	92	.....	.....	3.89	1,876	.....	.....

a Rod out.
b to c Ice conditions.

Daily Gauge Height and Discharge of Belly River near Stand Off, for 1913.

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.17	1,271	2.24	575	1.86	323	1.47	100	1.61	195	1.36	*b*144
2	2.99	1,121	2.17	528	1.86	323	1.49	111	1.60	187	1.36	137
3	2.88	1,033	2.14	507	1.86	323	1.49	111	1.59	190	1.36	130
4	2.81	980	2.14	507	1.86	323	1.50	116	1.57	194	1.36	126
5	2.77	950	2.16	521	1.86	323	1.53	133	1.53	194	1.36	123
6	2.65	865	2.14	507	1.86	323	1.56	150	1.51	186	1.36	122
7	2.57	804	2.14	507	1.86	323	1.54	138	1.47	175	1.36	122
8	2.57	804	2.14	507	1.78	274	1.54	138	1.47	165	1.36	124
9	2.57	804	2.16	521	1.67	211	1.57	155	1.47	166	1.36	127
10	2.52	769	2.57	804	1.62	183	1.57	155	1.47	174	1.36	131
11	2.47	734	2.40	685	1.68	217	1.62	183	1.47	173	1.38	135
12	2.44	713	2.27	596	1.68	217	1.84	311	1.47	166	1.40	136
13	2.43	706	2.22	562	1.62	183	2.07	461	1.48	156	1.37	132
14	2.37	664	2.15	514	1.57	155	2.02	428	1.50	145	....*a*	130
15	2.28	602	2.11	488	1.60	172	1.92	362	1.50	134	.....	137
16	2.72	913	2.09	474	1.56	150	1.82	298	1.52	127	.....	144
17	2.12	494	2.02	428	1.54	138	1.82	298	1.55	125	.....	140
18	2.07	461	2.06	455	1.62	183	1.67	211	1.57	124	.....	132
19	2.08	468	2.02	428	1.50	116	1.67	211	1.55	125	.....	121
20	2.09	474	1.97	395	1.49	110	1.65	200	1.52	126	.....	112
21	2.07	461	1.89	343	1.47	100	1.63	189	1.50	129	.....	120
22	2.02	428	1.93	369	1.47	100	1.63	189	1.57	134	.....	115
23	1.97	395	1.90	349	1.47	100	1.63	189	1.62	141	.....	108
24	2.07	461	1.86	323	1.47	100	1.63	189	1.64	146	.....	105
25	2.28	602	1.86	323	1.47	100	1.63	189	1.64	149	.....	112
26	2.44	713	1.86	323	1.47	100	1.63	189	1.64	152	.....	120
27	2.44	713	1.86	323	1.47	100	1.63	189	1.64	152	.....	125
28	2.28	602	1.86	323	1.47	100	1.62	183	1.64	153	.....	130
29	2.34	643	1.86	323	1.47	100	1.62	183	1.64	153	.....	135
30	2.32	630	1.86	323	1.47	100	1.62	183	1.64	150	.....	140
31	2.28	602	1.86	323	.....	.....	1.62	183	.....	.....	.....*a*	*c*144

a Rod out.
b to c Ice onditions.

Monthly Discharge of Belly River near Stand Off, for 1913.

(Drainage area 461 square miles).

Month.	Discharge in Second-Feet.				Run-Off	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	68	44	56.4	0.122	0.14	3,468
February	75	58	67.1	0.146	0.15	3,726
March	96	64	80.7	0.175	0.20	4,962
April	678	93	427.0	0.926	1.03	25,408
May	2,380	317	810.0	1.760	2.03	49,804
June	1,834	840	1391.0	3.020	3.37	82,770
July	1,271	395	706.0	1.530	1.76	43,410
August	804	323	457.0	0.991	1.14	28,100
September	323	100	186.0	0.403	0.45	11,068
October	461	100	204.0	0.443	0.51	12,543
November	195	124	156.0	0.338	0.38	9,283
December	144	105	128.0	0.277	0.32	7,870
The year					11.48	282,412

BELLY RIVER NEAR LETHBRIDGE.

This station was established on August 31, 1911, by A. W. P. Lowrie. It is located on the traffic bridge on the N.W. ¼ Sec. 1, Tp. 9, Rge. 22, W. 4th Mer., and is about two and a half miles from Lethbridge P. O.

A chain gauge of the standard type was installed on June 3, 1913. It is situated near the second pier from the right bank. The length of the chain is 30 feet from the bottom of weight to marker. The zero of the gauge (elev. 85.70) is referred to a bench mark (assumed elev. 100.00) marked on the right abutment by an arrow in white paint.

The channel is straight for 800 feet above and 2000 feet below the station. Above the station, the right bank is high and will not overflow. Below the station it is low and will overflow at flood stages. The left bank is low and liable to overflow. The bed of the stream is gravel and silt; it is liable to shift. At high stages there are five channels and at low stages three.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is at the left bank and is marked by a white arrow on the handrail. Distances are marked every ten feet on the handrail.

During 1913, the gauge was read by William Bedster.

DISCHARGE MEASUREMENTS of Belly River near Lethbridge, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 2	V. Meek	337.0	1,451	0.59	3.10	851
" 21	do	325.0	653	0.84	3.20	549
" 29	G. F. Deas	281.0	1,141	0.42	3.02	478
Feb. 13	do	309.0	1,010	0.37	3.02	380
Mar. 2	do	299.0	1,001	0.42	2.81	421
" 25	do	304.0	739	0.57	2.53	418
Apr. 21	H. O. Brown	416.0	2,653	3.20	5.01	8,408
May 13	R. Palmer	368.0	1,801	3.11	5.15	6,606
June 8	8o	496.0	3,852	4.89	8.35	18,825
" 23	do	433.0	2,980	3.53	6.46	10,189
July 7	do	435.0	2,681	2.81	5.76	7,543
" 26	do	367.0	2,052	2.12	4.05	4,350
Aug. 18	do	365.0	1,916	1.98	4.00	3,793
Sep. 2	do	345.0	1,364	1.54	3.18	2,518
" 20	do	301.0	1,300	1.21	2.35	1,575
Oct. 6	do	300.0	1,300	1.11	2.46	1,635
Nov. 3	do	340.0	1,486	1.34	2.92	2,029
Dec. 3	J. E. Degnan	290.0	1,130	1.06	2 40	1,202
" 13	do	296.0	1,239	1.06	2.35	1,317
" 24	do	292.0	884	0.32	1.83	284

Daily Gauge Height and Discharge of Belly River near Lethbridge, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.12	*a*850	2.89	440	2.83	420	3.22	800	4.63	4,963	9.20*b*	23,090
2	3.07	850	2.88	420	2.82	425	3.52	1,000	4.52	4,740	9.15*b*	22,840
3	3.10	860	2.87	410	2.87	430	3.92	1,500	4.59	4,880	9.13*b*	22,740
4	3.07	855	2.88	400	2.87	440	3.73	*a* 2,000	4.63	4,963	9.00	22,090
5	3.22	820	2.88	390	2.88	445	3.38	2,772	4.48	4,660	8.77	20,940
6	3.12	740	2.89	380	2.92	450	3.82	3,454	4.36	4,424	8.62	20,190
7	3.20	660	2.89	380	3.35	460	3.67	3,212	4.35	4,405	8.35	18,840
8	3.32	640	2.90	380	3.41	470	4.31	4,329	4.35	4,405	8.27	18,440
9	3.29	640	2.93	380	3.92	475	4.24	4,196	4.37	4,443	8.21	18,140
10	3.27	640	2.95	380	4.51	480	4.41	4,520	4.39	4,481	8.36	18,890
11	3.27	645	2.97	380	4.72	480	4.60	4,900	4.38	4,462	8.40	19,090
12	3.27	650	2.99	380	4.57	480	5.06	5,898	4.38	4,462	8.38	18,990
13	3.37	660	3.02	380	4.27	475	5.24	6,330	5.03	5,829	8.10	17,590
14	3.32	640	2.99	390	3.67	460	5.11	6,014	5.22	6,280	8.02	17,190
15	3.32	620	3.00	400	3.37	440	5.14	6,086	5.47	6,922	7.72	15,690
16	3.30	600	3.27	410	3 17	445	5.23	6,305	5 52	7,054	7.35	13,885
17	3.22	590	3.83	430	2.77	455	5.15	6,110	5.63	7,354	7.00	12,300
18	3.19	570	3 87	450	2.56	455	5.21	6,255	5.81	7,870	6.68	10,960
19	3.19	560	4.02	460	2.53	445	5.12	6,038	5.85	7,990	6.65	10,840
20	3.20	550	3.42	455	2.61	435	5.39	6,714	6.01	8,482	6.68	10,960
21	3.17	550	3.13	450	2.32	430	5.66	7,438	5.86	8,020	6.80	11,450
22	3.17	550	3.15	440	2.52	430	6.00	8,450	5.84	7,960	6.70	11,040
23	3.09	540	3.07	435	2.29	438	5.81	7,870	6.11	8,804	6.46	10,084
24	3.02	520	3.10	430	2.35	438	5.27	6,405	6.86	11,702	6.37	9,736
25	2.95	500	2.97	425	2.39	418	5.10	5,990	7.30	13,650	6.40	9,850
26	2.98	485	2.98	420	2.67	418	5.02	5,806	7.72	15,690	6.55	10,440
27	2.91	480	2.96	420	2.39	420	5.05	5,875	8.37	18,940	6.80	11,450
28	2.97	475	2.89	420	2.32	420	5.11	6,014	9.17	22,940	6.95	12,085
29	3.01	478	.....	.....	2.31	430	4.95	5,650	9.57	24,940	7.90	16,590
30	2.93	470	.....	.....	2.32	460	4.87	5,474	9.10*b*	22,590	7.65	15,340
31	2.88	460	.....	.....	2 92	600	.....	.....	9 10*b*	22 590	.....	.....

a Ice conditions Jan. 1 to April 4.
b Gauge height interpolated.

Daily Gauge Height and Discharge of Belly River near Lethbridge, for 1913. (*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*	*Feet.*	*Sec.-ft.*
1	7.14	12,920	4.03	3,814	3.09	2,377	2.17	1,383	2.83	2,056	2.22	a 1,428
2	6.87	11,744	3.95	3,675	3.15	2,455	2.20	1,410	2.84	2,068	2.20	1,300
3	6.66	10,880	3.70	3,260	3.22	2,548	2.22	1,428	2.94	2,188	2.22	1,200
4	6.40	9,850	3.74	3,324	3.26	2,604	2.22	1,428	2.82	2,044	2.17	1,140
5	6.15	8,940	3.76	3,324	3.27	2,618	2.50	1,700	2.75	1,965	2.19	1,160
6	5.87	8,050	3.75	3,340	3.26	2,604	2.98	2,236	2.75	1,965	2.17	1,140
7	5.80	7,840	3.82	3,454	3.26	2,604	2.47	1,670	2.77	1,987	2.15	1,100
8	5.70	7,550	3.87	3,539	3.15	2,455	2.48	1,680	2.74	1,954	2.08	1,060
9	5.58	7,216	3.90	3,590	3.10	2,390	2.51	1,710	2.68	1,888	1.95	1,000
10	5.41	6,766	4.24	4,196	3.04	2,312	2.52	1,720	2.56	1,866	2.00	1,040
11	5.37	6,662	5.01	5,783	3.04	2,312	2.55	1,750	2.67	1,877	2.12	1,100
12	5.31	6,506	4.97	5,694	3.02	2,286	2.53	1,730	2.70	1,910	2.20	1,200
13	5.23	6,305	4.50	4,700	2.92	2,164	2.70	1,910	2.56	1,760	2.30	1,317
14	5.10	5,990	4.43	4,560	2.74	1,954	2.84	2,068	2.50	1,700	2.39	1,300
15	4.99	5,738	4.20	4,120	2.71	1,921	3.12	2,416	2.34	1,540	2.20	1,100
16	4.73	5,173	4.22	4,158	2.56	1,760	3.32	2,688	2.67	1,877	2.15	1,020
17	4.50	4,700	4.00	3,760	2.43	1,630	3.36	2,744	2.70	1,910	2.20	1,060
18	4.32	4,348	3.99	3,743	2.28	1,482	3.34	2,716	2.66	1,866	2.10	980
19	4.18	4,084	3.88	3,556	2.37	1,570	3.29	2,646	2.66	1,866	1.87	900
20	4.02	3,796	3.68	3,228	2.24	1,446	3.32	2,688	2.67	1,877	1.80	840
21	4.02	3,796	3.62	3,132	2.46	1,660	3.27	2,618	2.50	1,700	1.77	700
22	4.00	3,760	3.57	3,055	2.37	1,570	3.20	2,520	2.32	1,520	1.80	500
23	4.00	3,760	3.54	3,010	2.34	1,540	3.14	2,442	2.00	1,230	1.95	360
24	4.01	3,778	3.35	2,730	2.34	1,540	3.02	2,286	2.22	1,428	2.01	300
25	4.03	3,814	3.22	2,548	2.32	1,520	3.06	2,338	2.64	1,844	1.75	500
26	4.00	3,760	3.30	2,660	2.29	1,491	3.04	2,312	2.51	1,710	1.80	460
27	4.35	4,405	3.20	2,520	2.27	1,473	3.02	2,286	2.39	1,590	2.30	480
28	4.30	4,310	3.15	2,455	2.25	1,455	3.05	2,325	2.32	1,520	2.35	500
29	4.25	4,215	3.05	2,325	2.22	1,428	3.10	2,390	2.22	1,428	2.55	600
30	4.14	4,012	3.12	2,416	2.17	1,383	3.04	2,312	2.24	1,446	2.65	640
31	4.15	4,030	3.12	2,416	.....	.....	2.96	2,212	.....	.....	2.50	a 600

a Ice conditions Dec. 1 to 31.

Monthly Discharge of Belly River near Lethbridge, for 1913.

(Drainage area 6,146 square miles).

Month.	Discharge in Second-Feet.				Run-Off	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	860	460	618	0.101	0.12	37,999
February	460	380	412	0.067	0.07	22,881
March	600	418	451	0.073	0.08	27,731
April	8,450	800	5,114	0.832	0.93	304,304
May	24,940	4,405	9,384	1.530	1.76	576,999
June	23,090	9,736	15,725	2.560	2.86	935,702
July	12,920	3,760	6,087	0.990	1.14	374,275
August	5,783	2,325	3,487	0.568	0.65	214,407
September	2,618	1,383	1,952	0.318	0.35	116,152
October	2,744	1,383	2,121	0.345	0.40	130,415
November	2,188	1,230	1,786	0.291	0.32	106,274
December	1,428	300	904	0.147	0.17	55,585
The year	.....	.....	.....	.....	8.85	2,902,724

ST. MARY RIVER DRAINAGE BASIN.

General Description..

St. Mary River, an important tributary of the Belly River and so indirectly of the South Saskatchewan River, heads in northern Montana on the eastern slope of the main range of the Rocky Mountains. It starts from the great Blackfoot glacier and receives affluents from numerous lesser glaciers. These streams unite within a short distance from their source and flow into Upper St. Mary Lake. Below this lake and in close proximity, is lower St. Mary Lake, the aggregate lengths of the two being about 22 miles. The river flows out of the lower lake, at an elevation of 4460 feet above mean sea level, and takes a northerly course through the foothills to the International Boundary. From the boundary it flows in a north and easterly direction through a rolling country, finally emptying into the Belly River near Lethbridge, Alberta.

The basin is bounded on the south by the Rocky Mountains, on the west by the watershed between Belly and St. Mary Rivers and on the east by the watershed between Milk and St. Mary Rivers. The upper portion of the basin is heavily timbered and receives its precipitation mostly in the shape of snowfall; the lower and major portion is totally devoid of tree growth and has a small precipitation.

The river flows through a very deep valley having steep banks making the diversion of water from this stream for irrigation an expensive undertaking. In Canada the Alberta Railway and Irrigation Company has water rights on this river. The headgates of their canal is at Kimball, 5 miles north of the boundary, and they already have 231 miles of ditch constructed, which irrigates land surrounding Lethbridge. Further construction is being planned and the works, when completed, will irrigate approximately 500,000 acres of at present semi-arid land.

As this is an international river, discharge measurements are taken on it by the Hydrographic Surveys branches of both the Canadian and American Governments. The hydrographers of both countries use a common gauging station near Kimball.

FIDLER BROTHER'S DITCH AT BOUNDARY CREEK.

This station was established on September 13, 1911, by L. J. Gleeson. It is situated in the S.E. ¼ Sec. 19, Tp. 1, Rge. 26, W. 4th Mer., on Fidler Brothers' irrigation ditch, eighteen miles southwest of Cardston.

The channel of the ditch is straight for a distance of thirty feet above and twenty below the gauge. The soil is clay with a little sand.

The gauge is placed in the centre of the ditch, 100 feet downstream from the headgate. It is a plain staff graduated to feet and tenths. The zero of the gauge (elev. 96.10) is referred to a wooden bench mark (assumed elev. 100.00), situated on the left bank, eight feet west of the gauge and on the line of the gauging section.

Discharge measurements can be made with a small Price meter, but on account of the small velocity, a weir is more suitable.

During 1913, the gauge was read by Jas. Fidler.

DISCHARGE MEASUREMENT of Fidler Bros'. Ditch at Boundary Creek, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 18.....	F. R. Burfield.....	4.0	1.63	1.56	1.33	2.55

DAILY GAUGE HEIGHT AND DISCHARGE of Fidler Bros'. Ditch at Boundary Creek, for 1913,

DAY.	June.	
	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17	1.33	2.50
18	1.33	2.50
19	1.17	1.80
20	1.33	2.50
21	1.33	2.50
22	1.17	1.80
23	1.17	1.80
24	1.17	1.80
25	1.33	2.50
26	1.33	2.50
27		
28		
29		
30		
31		

MONTHLY DISCHARGE of Fidler Bros'. Ditch at Boundary Creek, for 1913.

MONTH.	DISCHARGE IN SECOND FEET.				RUN OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
June (17-26)	2.50	1.80	2.22			44
The period						44

BOUNDARY CREEK AT FIDLER BROTHERS' RANCHE.

This station was established June 18, 1913, by F. R. Burfield, and W. A. Burton. It is about 17 miles by trail south of Cardston and is located on Fidler Brothers' ranche on the N.W. ¼ Sec. 20, Tp. 1, Rge. 26, W. 4th Mer. It is within 800 feet of the Boundary Creek P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is securely fastened to a post at the right bank. The zero (elev. 96. 98) is referred to a permanent iron bench mark (assumed elev. 100.00), located 25 feet from the right bank of the stream and 10 feet below the gauge rod.

The channel is straight for about 100 feet below and above the section. The current is fairly swift. The bed is of gravel, but is not liable to shift. The left bank is high and the right is low; neither is liable to overflow.

Discharge measurements are made by wading, ten feet below the gauge,

From June to December during 1913, the gauge was read once a day by Jas. Fidler.

Discharge Measurements of Boundary Creek at Fidler Bros'. Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 18	F. R. Burfield	12	15.6	0.82	1.74	12.7
July 28	do	13	16.0	0.75	1.71	12.1
Aug. 13	do	13	14.7	0.65	1.66	9.6
Sept. 3	do	12	14.7	0.40	1.59	5.8
Oct. 29	L Danielsen	18	7.4	1.15	1.65	8.5
Nov. 7	do	19	9.8	1.33	1.77	13.1

Daily Gauge Height and Discharge of Boundary Creek at Fidder Bros.' Ranche, for 1913.

Day.	June.		July.		August.		September.		October.		November.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Heiaht.	Discharge.	Gauge Height	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.01	26.0	1.74	13.1	1.65	8.7	1.67	9.7	1.68	10.2
2			2.04	28.0	1.72	12.1	1.66	9.2	1.66	9.2	1.74	13.1
3			2.03	27.0	1.72	12.1	1.65	8.7	1.67	9.7	1.68	10.2
4			1.70	11.2	1.68	10.2	1.65	8.7	1.68	10.2	1.70	11.2
5			1.70	11.2	1.70	11.2	1.65	8.7	1.68	10.2	1.70	11.2
6			1.70	11.2	1.72	12.1	1.65	8.7	1.67	9.7	1.70	11.2
7			1.70	11.2	1.70	11.2	1.64	8.2	1.69	10.7	1.67	9.7
8			1.72	12.1	1.74	13.1	1.64	8.2	1.69	10.7	1.62	7.2
9			1.72	12.1	1.76	14.1	1.65	8.7	1.68	10.2	1.64	8.2
10			1.70	11.2	1.73	12.6	1.67	9.7	1.67	9.7	1.64	8.2
11			2.01	26.0	1.72	12.1	1.66	9.2	1.72	12.1	1.67	9.7
12			1.70	11.2	1.68	10.2	1.64	8.2	1.74	13.1	1.67	9.7
13			1.71	11.6	1.70	11.2	1.63	7.7	1.74	13.1	1.67	9.7
14			1.70	11.2	1.70	11.2	1.64	8.2	1.72	12.1	1.68	10.2
15			1.70	11.2	1.72	12.1	1.63	7.7	1.74	13.1	1.68	10.2
16			1.72	12.1	1.68	10.2	1.65	8.7	1.70	11.2	1.70	11.2
17			1.70	11.2	1.67	9.7	1.62	7.2	1.71	11.6	1.70	11.2
18	1.70	a11.2	1.70	11.2	1.68	10.2	1.64	8.2	1.68	10.2	1.70	11.2
19	1.72	12.1	1.70	11.2	1.67	9.7	1.66	9.2	1.67	9.7	1.65	8.7
20	1.70	11.2	1.70	11.2	1.70	11.2	1.62	7.2	1.65	8.7	1.68	10.2
21	1.70	11.2	1.70	11.2	1.68	10.2	1.65	8.7	1.66	9.2	1.70	11.2
22	2.01	26.0	1.68	10.2	1.68	10.2	1.66	9.2	1.66	9.2	1.65	8.7
23	2.03	27.0	1.69	10.7	1.67	9.7	1.66	9.2	1.67	9.7	1.65	8.7
24	2.02	27.0	1.70	11.2	1.66	9.2	1.65	8.7	1.67	9.7	1.65	8.7
25	2.02	27.0	1.72	12.1	1.65	8.7	1.64	8.2	1.67	9.7	1.55	3.8
26	2.02	27.0	1.68	10.2	1.64	8.2	1.66	9.2	1.67	9.7	1.55	3.8
27	2.03	27.0	1.69	10.7	1.66	9.2	1.66	9.2	1.68	10.2	1.55	3.8
28	2.01	26.0	1.72	12.1	1.64	8.2	1.64	8.2	1.68	10.2	1.55	3.8
29	2.01	26.0	1.74	13.1	1.65	8.7	1.65	8.7	1.65	8.7	1.65	8.7
30	2.02	27.0	1.72	12.1	1.67	9.7	1.66	9.2	1.68	10.2	1.65	8.7
31			1.70	11.2	1.67	9.7			1.67	9.7		

a Station established.

Monthly Discharge of Boundary Creek at Fidler Bros' Ranche, for 1913.

(Drainage area 48 square miles).

Month.	Discharge in Second-Feet.				Run Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
June (18-30)	27.0	11.2	22.0	0.458	0.221	567
July	28.0	10.2	13.4	0.279	0.332	824
August	14.1	8.2	10.7	0.223	0.257	658
September	9.7	7.2	8.6	0.179	0.200	512
October	13.1	8.7	10.4	0.217	0.250	640
November	13.1	3.8	9.1	0.190	0.221	541
The period					1.462	3,742

ST. MARY RIVER NEAR KIMBALL.

This station was established by the Alberta Railway and Irrigation Company, in 1905. It is located on the S.W. ¼ Sec. 25, Tp. 1, Rge. 25, W. 4th Mer., about one mile above the Albesta Railway and Irrigation Company's dam and headgate.

The gauge, which is a plain staff graduated to feet and hundredths, is set in the right bank, a few feet upstream from the cable. A trench, lined with plank, connects a stilling box about the gauge with the channel in low water. The zero of the gauge (elev. 85.84) is referred to a permanent iron bench mark (assumed elev. 100.00), situated near the cable support on the right bank. In addition to the staff gauge there is a Friez Water Stage register located about one thousand feet upstream, which is installed in a concrete shelter at the right bank and is maintained in co-operation with the United States Geological Survey. The zero of the automatic gauge is 88.75, referred to a bench mark (assumed elev. 100.00), located on a spike on the downstream side of the concrete gauge shelter.

The channel is straight for about 450 feet above and 400 feet below the station. Both banks are high and not liable to overflow. The right bank is partly covered with scrub above the station, but at and below the station it is clear. The bed of the stream is of gravel and is liable to slight changes. The current is quite uniform all the way across the stream.

Discharge measurements are made by means of a cable car, and tagged wire at high and ordinary stages. At low water periods, the river can be waded. The initial point for soundings is the zero of the tagged wire, which is 44.8 feet the inside edge of the cable support on the right bank.

During 1913, the staff gauge was read daily by J. M. Dunn who also looked after the automatic gauge. The gauge records given are as far as possible those obtained from the automatic gauge.

Discharge Measurements of St. Mary River at Kimball, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 13	V. Meek	54	75	1.45	3.16	180
" 24	do	53	61	1.55	2.76	94
Feb. 6	G. F. Deas	55	66	1.50	2.70	100
" 24	do	55	72	1.97	2.82	141
Mar. 11	do	65	88	2.49	2.95	220
Apr. 25	do	225	490	2.10	3.35	1,028
May 4	F. R. Burfield	222	492	1.93	*a*2.65	949
" 19	W. A. Lamb (U.S.G.S.)	223	583	2 73	3.45	1,590
" 24	F. R. Burfield	229	697	3 24	3 96	2,260
" 26	do	233	834	3 65	4 58	3,042
June 5	do	234	1,086	4 80	6 05	5,209
" 9	do	234	1,026	4 88	5 76	5,007
" 13	R. R. Randell (U.S.G.S.)	231	949	5 01	5 74	4,750
" 13	W. A. Burton	234	1,008	4 94	5.78	4,979
" 27	F. R. Burfield	232	888	4.50	5.45	3,993
July 4	do	230	775	3 93	4.93	3,044
" 21	do	226	525	2.39	3.66	1,354
" 28	W. A. Lamb (U.S.G.S.)	227	534	2.72	3.71	1,450
Aug. 7	F. R. Burfield	226	516	2.49	3.56	1,283
" 20	W. A. Lamb (U.S.G.S.)	224	458	2.31	3.28	1,060
" 28	F. R. Burfield	224	420	2.04	3.04	855
Sept. 13	W. A. Lamb (U.S.G.S.)	223	334	1.65	2.55	550
" 24	L. Danielsen	220	295	1.51	2 35	468
Oct. 9	do	215	270	1.51	2.25	408
" 14	do	220	332	1.66	2 27	553
" 24	W. A. Lamb (U.S.G.S.)	222	284	1.34	2 26	382
Nov. 13	L. Danielsen	221	276	1.24	2 06	344
" 26	J. E. Degnan	218	249	1.41	2.04	351
Dec. 5	do	65	92	2.66	*b*1.36	244
" 16	W. A. Burton	65	90	2.28	0.30	205
" 30	J. E. Degnan	40	71	1.25	0.29	88

a to b Gauge heights at automatic gauge.

Daily Gauge Height and Discharge of St. Mary River at Kimball, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*	*Feet.*	*Sec.-ft.*
1	3.00	202	2.45	115	2.55	135	2.36	238	2.76	1,020	6.05	5,320
2	3.00	199	2.65	110	2.55	137	2.37	250	2.74	1,004	6.09	5,380
3	3.00	196	2.85	106	2.55	148	2.38	263	2.70	980	6.07	5,350
4	3.00	193	2.85	103	2.65	160	2.38	277	2.68	968	6.06	5,340
5	3.20	190	2.70	102	2.70	172	2.43	293	2.65	950	6.01	5,260
6	3.40	187	2.70	101	2.75	186	2.53	309	2.62	932	5.99	5,220
7	3.30	184	2.80	102	2.80	200	2.63	324	2.60	920	5.81	4,940
8	3.35	183	2.90	108	2.95	210	2.64	343	2.62	932	5.83	4,970
9	3.40	185	2.80	115	2.95	216	2.94	365	2.64	944	5.82	4,950
10	3.43	187	2.82	121	2.95	218	3.06	392	2.57	902	5.86	5,020
11	3.50	187	2.82	127	2.95	219	3.19	418	2.71	986	5.98	5,210
12	3.55	183	2.85	132	2.87	219	3.19	450	2.89	1,100	6.07	5,350
13	3.45	180	2.85	137	2.80	218	3.54	500	3.02	1,210	5.89	5,060
14	3.60	181	2.90	140	2.80	216	3.04	580	3.09	1,260	5.79	4,800
15	3.60	188	3.00	142	2.85	209	2.05	700	3.09	1,260	5.67	4,600
16	2.90	182	3.00	145	2.90	198	1.65	910	3.18	1,340	5.55	4,400
17	1.98	172	3.00	146	2.90	191	3.45	1,120	3.24	1,400	5.56	4,380
18	1.90	160	3.00	145	2.86	188	3.50	1,180	3.37	1,520	5.55	4,340
19	2.00	140	3.00	145	2.91	187	3.50	1,180	3.45	1,600	5.56	4,330
20	2.06	123	3.00	143	2.81	185	3.55	1,240	3.33	1,480	5.56	4,310
21	2.00	109	2.95	142	2.81	183	2.99	1,180	3.30	1,450	5.43	4,090
22	2.30	101	2.95	141	2.79	180	2.98	1,170	3.42	1,570	5.02	3,460
23	2.90	96	2.95	140	2.68	178	2.86	1,080	3.71	1,900	4.97	3,360
24	2.76	95	2.82	140	2.62	177	2.84	1,070	4.00	2,270	4.90	3,240
25	3.00	99	2.70	140	2.57	177	2.90	1,110	4.32	2,720	4.92	3,240
26	2.30	128	2.70	139	2.57	180	2.90	1,110	4.66	3,190	5.12	3,520
27	2.00	138	2.65	137	2.57	187	2.96	1,160	5.15	3,920	5.42	3,950
28	1.95	137	2.63	136	2.42	196	2.93	1,130	5.17	3,950	5.65	4,250
29	2.30	132	.....	.....	2.32	205	2.87	1,090	5.92	5,110	5.58	4,110
30	2.40	127	.....	.....	2.32	215	2.81	1,050	6.01	5,260	5.41	3,820
31	2.45	121	.....	.....	2.35	226	.....	.....	6.00	5,240	.....	.....

NOTES: Ice conditions from Jan. 1 to April 16 discharges estimated from April 17 to April 20, discharges are from gauge height readings at the cable station. From April 21 to Dec. 15 discharges are estimated from automatic gauge records.

"ERRATUM IN 1912 REPORT"

Monthly Discharge of St. Mary River near Kimball for 1911.

(Drainage area 472 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	220	194	210	0.44	0.51	12,937
February	214	167	189	0.40	.42	10,508
March	360	131	196	0.41	0.47	12,034
April	1,118	250	527	1.12	1.25	31,376
May	3,839	1,074	2,070	4.38	5.05	127,249
June	4,391	2,388	3,651	7.74	8.64	217,269
July	2,714	1,284	1,783	3.77	4.35	109,630
August	1,420	684	1,044	2.21	2.55	64,217
September	2,080	684	1,377	2.92	3.26	81,949
October	1,030	390	676	1.43	1.65	41,547
November	405	286	334	0.70	0.78	19,874
December	308	128	190	0.40	0.46	11,664
The year					29.39	740,254

Note.—This table is inserted in this report to correct a table which was published on page 232 of the report for 1912. The mean Monthly Discharges were incorrect, but the balance of the table was correct as then published.

Daily Gauge Height and Discharge of St. Mary River at Kimball, for 1913.

Day	July.		August.		September.		October.		November.		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.29	3,620	3.54	1,270	2.98	816	2.18	372	2.28	416	1.72	207
2	5.24	3,530	3.53	1,260	2.98	816	2.17	368	2.28	[illegible]	1.98	298
3	5.12	3,340	3.59	1,310	2.93	781	2.16	364	2.24	398	2.02	312
4	4.94	3,060	3.60	1,320	2.94	788	2.24	398	2.27	412	1.96	291
5	4.81	2,860	3.59	1,310	2.86	732	2.24	398	2.23	394	1.86	256
6	4.71	2,710	3.57	1,290	2.86	732	2.25	402	2.21	384	1.84	[illegible]9
7	4.65	2,620	3.55	1,270	2.74	654	2.25	402	2.19	376	1.84	49
8	4.58	2,520	3.64	1,360	2.70	630	2.26	407	2.27	412	1.83	46
9	4.53	2,450	3.82	1,530	2.60	570	2.26	407	2.23	394	1.82	[illegible]42
10	4.47	2,360	3.96	1,690	2.56	550	2.24	398	2.23	394	1.85	252
11	4.47	2,360	3.86	1,580	2.46	500	2.30	425	2.23	394	1.79	232
12	4.45	2,330	3.78	1,490	2.38	461	2.48	510	2.25	402	1.72	207
13	4.37	2,220	3.72	1,430	2.37	456	2.56	550	2.13	352	1.77	224
14	4.24	2,040	3.69	1,400	2.34	443	2.61	576	2.15	360	1.76	221
15	4.06	1,810	3.65	1,360	2.35	448	2.58	560	2.17	368	1.69	197
16	3.91	1,630	3.53	1,260	2.40	470	2.55	545	2.23	394	.....*a*	205
17	3.78	1,490	3.45	1,180	2.43	485	2.49	515	2.23	394	.....	220
18	3.70	1,410	3.40	1,140	2.47	505	2.48	510	2.23	394	.....	227
19	3.65	1,360	3.33	1,080	2.50	520	2.45	495	2.22	389	.....	205
20	3.62	1,340	3.24	1,010	2.53	535	2.43	485	2.21	384	.....	190
21	3.65	1,360	3.18	964	2.49	515	2.36	452	2.17	368	.....	172
22	3.68	1,390	3.11	908	2.51	525	2.36	452	2.13	352	.....	151
23	3.67	1,380	3.07	879	2.47	505	2.35	448	2.21	384	.....	122
24	3.65	1,360	3.03	851	2.36	452	2.28	416	2.14	356	.....	100
25	3.69	1,400	3.02	844	2.37	456	2.31	430	2.09	336	.....	96
26	3.89	1,610	3.04	858	2.26	407	2.36	452	2.04	319	.....	93
27	3.84	1,550	3.02	844	2.20	380	2.36	452	2.04	319	.....	92
28	3.75	1,460	3.02	844	2.20	380	2.35	448	1.91	274	.....	91
29	3.70	1,410	3.01	837	2.18	372	2.31	430	1.89	266	.....	90
30	3.71	1,420	3.00	830	2.19	376	2.31	430	2.08	333	.....	87
31	3.62	1,340	3.00	830	.....	.....	2.25	402	.....	.....	.....	78

a Ice conditions to end of year. Gauge heights on several rods and were useless.

Monthly Discharge of St. Mary River at Kimball, for 1913.

(Drainage area 472 square miles).

Month.	Discharge in Second Feet.				Run Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre feet.
January	202	95	158	0.335	0.386	9,715
February	146	101	129	0.273	0.284	7,164
March	226	135	191	0.405	0.467	11,744
April	1,240	238	749	1.587	1.771	44,569
May	5,260	902	1,912	4.051	4.671	117,564
June	5,380	3,240	4,519	9.574	10.681	268,900
July	3,620	1,340	2,024	4.288	4.944	124,450
August	1,690	830	1,162	2.462	2.838	71,448
September	816	372	542	1.148	1.281	32,251
October	576	364	448	0.949	1.094	27,548
November	416	266	371	0.786	0.877	22,076
December	312	78	190	0.403	0.465	11,683
The year	.....	.....	.....	.....	29.759	749,112

ALBERTA RAILWAY AND IRRIGATION COMPANY CANAL NEAR KIMBALL.

This station was established July 26, 1910, by F. H. Peters. It is located at the flume over Rolph Creek on the S.E. ¼ Sec. 21, Tp. 2, Rge. 24, W. 4th Mer. It is by trail fifteen miles southeast of Cardston, and six miles northeast of Kimball.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to the side of the flume five feet downstream from the foot bridge. The datum of the gauge (assumed elev. 100.00) is the bottom of the flume.

The flume carries all the water delivered to the company's irrigation system. It is 768 feet long, 27 feet wide, and 6 feet high (inside dimensions) and is perfectly straight. It is built of smooth plank and has a fall of one hundredth of a foot in sixteen feet.

Discharge measurements are made from a small footbridge spanning the flume at a point about midway from the ends. The initial point for soundings is the inside face of the left side of the flume.

This canal and irrigation system is known locally as the Canadian Pacific Railway Company's Lethbridge System.

During 1913, the gauge was read by J. M. Dunn, ditch rider for the company.

DISCHARGE MEASUREMENTS of Alberta Railway and Irrigation Company Canal near Kimball, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
April 30	F. R. Burfield	27.2	36.0	2.81	1 32	100.
May 15	do	27.2	59.0	4.33	2 07	256.
June 6	do	27.2	82.0	5.75	2.88	469.
" 6	do	27.2	82.0	5.63	2 88	459.
" 12	W. A. Burton	27.2	94.5	6.04	3.20	571.
" 28	F. R. Burfield	27.2	80.0	5.36	2.74	429.
July 9	W. A. Burton	27.2	71.2	5.15	2.53	367.
" 22	F. R. Burfield	27.2	72.0	5.02	2.47	360.
Aug. 8	do	27.2	73.0	4.95	2.50	360.
" 27	do	27.2	85.0	5.60	2.99	474.
Sept. 20	L. Danielsen	27.2	69.0	4.68	2 43	322.

DAILY GAUGE HEIGHT AND DISCHARGE of Alberta Railway and Irrigation Company Canal near Kimball, for 1913.

DAY.	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec. ft.*	*Feet.*	*Sec. ft.*	*Feet.*	*Sec. ft.*	*Feet.*	*Sec. ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.35*a*	106	2.75	428	2.55	372	2.45	345	2.52	364	2 37	325
2	1.45	126	2.85	458	2.55	372	2.47	350	2.52	364	2.47	350
3	1.50	136	2.85	458	2 55	372	2.53	366	2.51	361	2.68	407
4	1.50	136	2.86	461	2 55	372	2.55	372	2 52	364	2 61	389
5	1.50	136	2.88	467	2.55	372	2.57	377	2.52	364	2.54	369
6	1.60	156	3.00	505	2.55	372	2.55	372	2.52	364	2.47	350
7	2.05	252	3.05	521	2 55	372	2.53	366	2.52	364	2 47	350
8	2.05	252	3 05	521	2 54	369	2.50	359	2.52	364	2.40	333
9	2.05	252	3.05	521	2 53	366	2.50	359	2.52	364	1 10	58
10	2.30	308	3.05	521	2 53	366	2.50	359	2.52	364		
11	2.55	372	3.05	521	2 57	377	2.50	359	2.52	364		
12	2.65	400	3.20	571	2 48	352	2 50	359	2.30	308		
13	2.55	372	3 22	577	2 41	335	2.50	359	2.48	352		
14	2.05	252	3.22	577	2.35	320	2.50	359	2.46	348		
15	2.05	252	3 20	571	2.35	320	2.50	359	2 45	345		
16	2.05	252	3.35	620	2.35	320	2.50	359	2 45	345		
17	2.07	256	3 53	682	2 40	333	2 49	355	2 43	340		
18	2.10	262	3.33	613	2 40	333	2.48	352	2 42	338		
19	2.07	256	3.30	603	2.40	333	2.48	352	2 43	340		
20	2.05	252	3.33	613	2.42	338	2 48	352	2 43	340		
21	2.06	254	3.33	613	2.45	345	2 18	352	2 43	340		
22	2.07	256	3.30	603	2 47	350	2 48	352	2 41	335		
23	2.10	262	3 30	603	2 45	345	2 48	352	2 40	333		
24	2.08	258	3.05	521	2 45	345	2 48	352	2 35	320		
25	2.05	252	3.00	505	2 45	345	2 95	489	2.28	303		
26	2.05	252	2 90	474	2 47	350	2 99	501	2 27	301		
27	2.05	252	2.85	458	2 47	350	2 99	501	2 25	297		
28	2 05	252	2.74	425	2.47	350	3 00	505	2.24	294		
29	2.50	359	2.65	400	2.47	350	3 00	505	2 31	311		
30	2.80	442	2 55	372	2.46	348	2 51	361	2.35	320		
31	2.93	483			2.46	348	2.51	361				

a No Gauge Heights previous to this date.

DISCHARGE MEASUREMENTS of Alberta Railway and Irrigation Company Canal near Kimball, in 1913.

MONTH.	DISCHARGE IN SECOND FEET.				RUN OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
May	483	106	262			16,110
June	682	372	526			31,300
July	377	320	351			21,580
August	505	345	381			23,428
September	364	294	340			20,230
October (1-9)	407	58	326			5,820
The period						118,468

ROLPH CREEK NEAR KIMBALL.

This station was established on May 17, 1911, by L. J. Gleeson. It is located at the Alberta Railway and Irrigation Company's flume, in S.E. ¼ Sec. 21, Tp. 2, Rge. 24, W. 4th Mer. It is six miles northeast of Kimball and fifteen miles southeast of Cardston.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the upstream side of the right wing wall. The zero (elev. 93.41) is referred to a permanent iron bench mark (assumed elev. 100.00), located about 100 feet downstream on the left bank.

The channel is straight for 200 feet above the station and for 150 feet below. The bed is gravelly in character and shifts during high water. Both banks are low, bare, and overflow at high stages. While passing under the flume the water is carried over an apron built to protect the piling from scour.

Discharge measurements are made by wading at or near the gauge.

During 1913, the gauge was read by J. M. Dunn.

DISCHARGE MEASUREMENTS of Rolph Creek near Kimball, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 25	G. F. Deas	19.7	16.90	1.37	1.28	23.00
" 30	F. R. Burfield	19.0	13.10	1.06	1.06	14.00
May 15	do	19.0	11.50	0.90	0.96	10.40
June 6	do	13.5	4.47	1.17	0.76	5.24
" 12	do	9.0	3.10	1.37	0.65	4.26
" 28	do	19.0	12.60	1.08	0.98	13.50
July 22	do				0.51	*a* 0.35
Aug 8	do				0.55	*a* 1.13
" 27	do				0.54	*a* 0.69
Sept. 20	L. Danielsen				0.52	*a* 0.58
Oct. 8	do				0.52	*a* 0.70
Nov. 14	do	11.0	3.90	0.65	0.54	2.52

a Weir measurement.

Daily Gauge Height and Discharge of Rolph Creek near Kimball, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.00	11.7	0.93	9.7
2			1.05	13.3	0.86	7.8
3			1.07	14.0	0.84	7.2
4			1.10	15.1	0.84	7.2
5			1.05	13.3	0.83	7.0
6			1.05	13.3	0.75	5.2
7	b 2.00	58.0	1.05	13.3	0.73	4.7
8	a 1.98	57.0	1.04	13.0	0.70	4.5
9	a 1.95	55.0	1.03	12.7	0.68	4.2
10	a 1.92	54.0	1.01	12.0	0.68	4.4
11	1.90	53.0	1.00	11.7	0.67	4.4
12	a 1.85	50.0	0.96	10.6	0.65	4.3
13	a 1.80	48.0	0.97	10.9	0.65	4.2
14	1.75	46.0	0.96	10.6	0.65	4.2
15	1.70	43.0	0.95	10.3	0.64	3.9
16	1.70	43.0	0.93	9.7	0.62	3.4
17	1.65	41.0	1.00	11.7	0.60	2.8
18	1.65	41.0	1.45	31.0	0.60	2.8
19	1.60	38.0	1.40	29.0	0.58	2.2
20	a 1.55	36.0	1.35	26.0	0.55	1.4
21	1.50	34.0	a 1.33	25.0	0.53	0.8
22	1.42	30.0	1.30	24.0	0.55	1.4
23	1.30	24.0	1.27	22.0	0.55	1.4
24	1.27	23.0	1.25	22.0	0.55	1.4
25	1.25	22.0	1.20	19.3	0.55	1.4
26	1.15	17.1	1.15	17.1	0.75	7.0
27	1.10	15.1	1.10	15.1	0 80	8.4
28	1.05	13.3	1.05	13.3	0.98	13.4
29	1.00	11.7	1.03	12.7	a 1.06	15.7
30	1.03	12.7	1.00	11.7	1.15	18.2
31			0.95	10.3		

a Gauge height interpolated.
b No gauge height observations were made previous to this date.

Daily Gauge Height and Discharge of Rolph Creek, near Kimball, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.20	20.00	0.60	2.00	0.50	0.00	0.60	2.80
2	1.15	18.20	0.58	2.20	0.50	0.00	0.60	2.80
3	1.15	18.20	0.58	2.20	0.52	0.56	0.62	3.40
4	1.13	17.60	0.58	2.20	0.53	0.84	0.62*a*	3.40
5	1.00	14.00	0.58	2.20	0.52	0.56	0.62*a*	3.40
6	0.94*a*	12.30	0.57	2.00	0.52	0.56	0.61*a*	3.10
7	0.87	10.40	0.56	1.68	0.51*a*	0.28	0.60	2.80
8	0.85	9.80	0.55	1.40	0.50	0.00	0.60	2.80
9	0.80	8.40	0.60	2.80	0.49	0.00	0.59	2.50
10	0.75	7.00	0.65	4.20	0.48	0.00	0.58	2.20
11	0.70	5.60	0.65	4.20	0.48	0.00	0.62*a*	3.40
12	0.65	4.20	0.67	4.80	0.48	0.00	0.66*a*	4.55
13	0.63*a*	3.60	0.66	4.50	0.48	0.00	0.70	5.60
14	0.60	2.80	0.67	4.80	0.49	0.00	0.62	3.40
15	0.58	2.20	0.67	4.80	0.50	0.00	0.76	7.30
16	0.58	2.20	0.66	4.50	0.51	0.28	0.78*a*	7.80
17	0.58	2.20	0.64*a*	3.90	0.51	0.28	0.80	8.40
18	0.56	1.70	0.62*a*	3.40	0.52	0.56	0.80*a*	8.40
19	0.55	1.40	0.60	2.80	0.51	0.28	0.80*a*	8.40
20	0.54*a*	1.12	0.59	2.50	0.52	0.56	0.80	8.40
21	0.53	0.84	0.58	2.20	0.51*a*	0.28	0.78*a*	7.80
22	0.51	0.28	0.57	2.00	0.50	0.00	0.75	7.00
23	0.50	0.00	0.57	2.00	0.55	1 40	0.75	7 00
24	0.48	0.00	0.56*a*	1.68	0.56	1.68	0.70	5.60
25	0.45	0.00	0.55	1.40	0.58	2.20	0.68*a*	5.00
26	0.50	0.00	0.54	1.14	0.60	2.80	0.66*a*	4.50
27	0.50	0.00	0.54	1.14	0.62	3.40	0.65	4.20
28	0.55	1.40	0.53	0.84	0.60	2.80	0.65	4.20
29	0.65	4.20	0.52	0.56	0.60	2.80	0.65*a*	4.20
30	0.63	3.60	0.51	0.28	0.60	2.80	0.65	4.20
31	0.60	2.80	0.55	1.40	.....	.....	0.65	4.20

a Gauge height interpolated.

Monthly Discharge of Rolph Creek near Kimball, for 1913.

(Drainage area 74 sqaure miles).

Month.	Discharge in Second-Feet.				Run Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (7-30)	58.0	11.70	36.10	0.488	0.436	1,718
May	31.0	9.70	15.70	0.212	0.244	965
June	18.2	0.80	5.49	0.074	0.083	326
July	20.0	0.00	5.68	0.076	0.088	349
August	4.8	0.28	2.53	0.034	0.039	156
September	3.4	0.00	0.83	0.011	0.012	49
October	8.4	2.20	4.93	0.067	0.077	303
The period	.....	.....	.....	.....	0.979	3,866

LEE CREEK AT CARDSTON.

This station was established on June 28, 1909, by H. C. Ritchie. It is located at a footbridge in the eastern portion of the town of Cardston in the N.W. ¼ Sec. 10, Tp. 3, Rge. 25, W. 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a pile near the east end of the footbridge. The zero (elev. 87.91) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank 100 feet upstream from the gauge.

The channel is straight for 100 feet above and 300 feet below the station. The bed of the stream is composed of gravel with a thin covering of soft mud. In high water the current is very swift, but in low water is comparatively slow. The right bank is of clay formation, high and not liable to overflow. The left is low, gravelly and overflows during high water.

On account of the constantly shifting character of the bed during periods of high water, measurements are made at the most suitable sections near the gauge. When the water is low, a section 150 feet upstream from the footbridge is used. The initial point of soundings is on the left bank and is marked with a stake driven into the left bank, close to the water's edge.

During 1913, the gauge was read by Ora S. Williams.

DISCHARGE MEASUREMENTS of Lee Creek at Cardston, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan 4	V Meek	18.0	12.90	1.03	1.75	13.4
" 11	do	17.0	10.70	0.76	2.03	8.1
" 23	do	17.0	12.00	0.52	2.35	6.3
Feb 1	G. F. Deas	17.0	11.13	0.95	2.77	10.6
" 10	do	17.0	14.70	0.86	3.10	12.6
" 15	do	17.0	13.70	1.02	3.20	14.0
" 22	do	17.0	12.38	1.02	3.25	12.6
Mar. 10	do	43.5	48.00	1.06	3.16	51.0
April 19	do	77.0	88.30	2.93	1.90	260.0
May 6	F. R. Burfield	71.5	63.40	2.03	1.54	129.0
" 13	do	74.0	77.40	2.37	1.70	183.0
" 29	do	102.0	118.00	2.68	1.94	317.0
June 11	do	73.0	68.00	2.34	1.63	159.0
" 30	do	75.5	83.80	2.66	1.75	223.0
July 5	do	72.5	57.50	2.00	1.47	115.0
" 17	do	30.5	31.00	1.71	1.24	53.0
Aug. 3	do	29.5	29.40	1.28	1.19	38.0
" 23	do	28.0	27.00	0.98	1.11	26.0
Sept. 11	do	25.0	18.40	0.91	1.04	16.7
" 25	L. Danielsen	28.0	22.00	0.92	1.01	20.0
Oct. 7	do	28.0	26.90	1.05	1.10	28.0
" 16	do	26.4	26.40	1.46	1.20	38.0
" 28	do	30.0	22.20	1.11	1.15	25.0
Nov. 10	do	29.0	27.00	1.33	1.14	36.0

Daily Gauge Height and Discharge of Lee Creek at Cardston, for 1913.

Day.	January.		February.		March.		April.		May.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.85	a 14.0	2.77	10.6	2.65	20	3.35	86	1.70	186
2	1.83	14.0	2.81	10.6	2.68	24	3.15	150	1.64	162
3	1.84	14.0	2.84	11.0	2.65	25	3.10	235	1.61	152
4	1.88	13.4	2.81	11.0	3.05	28	3.01	315	1.57	137
5	1.80	13.0	2.82	11.0	3.15	32	2.95	445	1.53	123
6	1.80	12.5	2.92	11.5	3.40	35	2.95	490	1.54	127
7	1.85	10.5	2.93	11.5	3.49	40	2.89	a 620	1.62	155
8	1.95	9.0	3.12	11.5	3.45	43	2.65	653	1.57	137
9	1.85	8.0	3.12	12.0	3.29	48	2.50	578	1.57	137
10	1.93	8.5	3.10	12.6	3.15	51	1.94	298	1.57	137
11	2.00	8.1	3.13	13.0	3.05	55	1.93	293	1.72	195
12		8.0	3.08	13.0	3.05	58	1.94	298	1.72	195
13		8.0	3.00	13.5	3.12	60	1.94	298	1.70	186
14		8.0	2.93	13.5	3.15	61	1.92	288	1.72	195
15		8.0	3.22	14.0	2.85	62	1.90	278	1.68	178
16		8.0	3.29	14.0	3.14	64	1.91	283	1.75	208
17		8.0	3.26	13.5	2.98	65	1.91	283	1.76	212
18		8.0	3.27	13.5	2.85	67	1.92	288	1.90	278
19		7.5	3.33	13.0	2.74	68	1.90	278	1.95	303
20		7.5	3.33	13.0	2.64	70	1.90	278	1.91	283
21		7.0	3.23	13.0	2.65	72	1.84	248	1.90	278
22		6.5	3.25	12.6	2.54	73	1.80	230	1.91	283
23		6.3	3.15	13.0	2.49	75	1.73	199	1.95	303
24		6.5	3.06	14.0	2.49	76	1.73	199	1.96	308
25		7.0	2.95	15.0	2.45	77	1.71	190	1.95	303
26		7.5	2.80	15.0	2.45	78	1.71	190	1.96	308
27		8.0	2.85	16.0	2.45	80	1.71	190	1.98	318
28		8.5	2.65	18.0	2.45	81	1.70	186	1.96	308
29		9.0			3.25	82	1.65	166	1.94	298
30		9.5			3.52	83	1.83	244	1.90	278
31		10.0			3.42	84			1.89	273

a Ice conditions Jan. 1 to April 7.

Daily Gauge Height and Discharge of Lee Creek at Cardston, for 1913.

Day.	June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.80	230	1.74	204	1.15	34	1.08	26.0	0.96	14.8
2	1.82	239	1.65	166	1.11	29	1.05	22.0	0.95	14.0
3	1.77	217	1.60	148	1.11	29	1.05	20.0	0.96	14.8
4	1.75	208	1.53	123	1.15	34	1.05	22.0	1.00	18.0
5	1.73	199	1.47	104	1.14	33	1.00	18.0	1 03	20.0
6	1.68	178	1.45	98	1.13	32	1.00	18.0	1.03	20.0
7	1.66	170	1.47	104	1.12	30	0.99	17.2	1.10	28.0
8	1.66	170	1.43	92	1.15	34	0.95	14.0	1.10	28.0
9	1.66	170	1.39	81	1.37	76	0.95	14.0	1.05	22.0
10	1.70	186	1.35	71	1.55	130	0.99	17.2	1.05	22.0
11	1.63	159	1.35	71	1.35	71	1.04	21.0	1.33	67.0
12	1.64	162	1.34	69	1.26	52	0.95	14.0	1.40	84.0
13	1.64	162	1.31	62	1.24	48	0.95	14.0	1.34	69.0
14	1.60	148	1.28	56	1.23	46	0.95	14.0	1.30	60.0
15	1.55	130	1.26	52	1.20	41	0.95	14.0	1.25	50.0
16	1.53	123	1.26	52	1.16	35	0.95	14.0	1.22	45.0
17	1.50	113	1.23	46	1.16	35	0.95	14.0	1.17	37.0
18	1.49	110	1.22	45	1.16	35	0.95	14.0	1.14	33.0
19	1.47	104	1.20	41	1.18	38	0.95	14.0	1.08	26.0
20	1.53	123	1.19	40	1.13	32	0.95	14.0	1.09	27.0
21	1.45	98	1.17	37	1.11	29	0.95	14.0	1.09	27.0
22	1.43	92	1.18	38	1.10	28	1.05	22.0	1.09	27.0
23	1.39	81	1.18	38	1.07	24	1.05	22.0	1.07	24.0
24	1.38	79	1.16	35	1.07	24	1.00	18.0	1.08	26.0
25	1.37	76	1.15	34	1.06	23	1.01	18.8	1.08	26.0
26	1.97	313	1.58	141	1.06	23	0.95	14.0	1.09	27.0
27	2.18	418	1.47	104	1.05	22	0.95	14.0	1.09	27.0
28	2.20	428	1.23	46	1.06	23	0.99	17.2	1.15	34.0
29	1.97	313	1.24	48	1.06	23	1.00	18.0	1.09	27.0
30	1.84	208	1.28	56	1.09	27	0.96	14.8	1.09	27.0
31	.....	.....	1.17	37	1.08	26	.....	.....	1.11	b 29.0

b Ice conditions after October; no discharge measurements made.

Monthly Discharge of Lee Creek at Cardston, for 1913.

(Drainage area 118 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	14.0	16.3	9.09	0.077	0.09	559
February	18.0	10.6	13.00	0.110	0.12	722
March	84.0	20.0	59.30	0.502	0.58	3,646
April	653.0	86.0	293.00	2.480	2.77	17,435
May	318.0	123.0	224.00	1.900	2.19	13,773
June	428.0	76.0	180.00	1.530	1.71	10,711
July	204.0	34.0	75.40	0.639	0.74	4,636
August	130.0	22.0	37.60	0.319	0.37	2,312
September	26.0	14.0	16.90	0.143	0.16	1,005
October	84.0	14.0	32.30	0.274	0.32	1,986
The period	.....	.....	.....	.....	9.05	56,785

LEE CREEK AT LAYTON'S RANCHE.

This station was established May 25, 1913, by F. R. Burfield. It is located on the S.E. ¼ Sec. 27, Tp. 2, Rge. 26 West of the 4th Mer., about six miles southwest of the town of Cardston. It is two miles upstream from the intake of the Cardston water supply.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to a post driven into a crack in the rock and stayed to the left bank. The zero of the gauge (elev. 88.14) is referred to a permanent iron bench mark (assumed elev. 100.00), located at the fence north of Mr. Layton's house, seven feet from the northwest corner.

The channel is straight for 300 feet above and 400 feet below the station. The right bank is fairly high and covered with brush; it may overflow in flood stages. The left bank is high and clean and will not overflow. The bed of the stream is of solid rock, which is overlaid with gravel near the right bank. There is a gravel bar 300 feet below the gauge.

Discharge measurements are made at a point 15 feet upstream from the gauge, by wading. The initial point for soundings is a spike driven into the left bank.

During 1913, the gauge was read by B. Layton.

DISCHARGE MEASUREMENTS of Lee Creek at Layton's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec*	*Feet.*	*Sec.-ft.*
June 17	F. R. Burfield	53	55.4	1.96	2.16	108.0
July 7	do	48	51.3	1.70	2.14	87.0
" 18	do	44	41.0	1.14	1.94	48.0
Aug. 6	do	39	34.9	0.91	1.82	32.0
" 25	do	38	32.1	0.75	1.73	24.0
Sept. 12	do	25	11.8	1.46	1.62	17.2
" 26	L. Danielsen	30	19.5	1.18	1.72	23.0
Oct. 18	do	34	24.0	1.38	1.89	33.0
Nov. 4	do	36	27.6	1.46	1.88	40.0

DAILY GAUGE HEIGHT AND DISCHARGE of Lee Creek at Layton Ranche, for 1913.

Day.	May.		June.		July.		August.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.50	196	2.33	149	1.91	44
2			2.48	191	2.28	135	1.88	39
3			2.47	188	2.23	121	1.85	36
4			2.45	182	2.22	118	1.83	33
5	[b]		2.42	174	2.19	110	1.81	31
6	2.20	112	2.39	166	2.16	101	1.82	32
7	2.21	115	2.34	157	2.04	69	1.78	28
8	2.23	121	2.33	152	2.09	82	1.85	36
9	2.24	124	2.33	149	2.07	76	1.93	46
10	2.24	124	2.30	140	2.06	74	1.99	58
11	2.26	129	2.28	135	2.06	74	1.96	52
12	2.28	135	2.25	126	2.05	72	1.95	50
13	2.30	140	2.23	121	2.05	72	1.98	55
14	2.31	143	2.21	115	2.04	69	1.95	50
15	2.33	149	2.20	112	2.03	67	1.93	46
16	2.34	152	2.18	107	2.00	60	1.92	45
17	2.36	157	2.16	101	1.97	54	1.91	44
18	2.37	160	2.13	93	1.95	50	1.88	39
19	2.39	166	2.11	87	1.93	46	1.85	36
20	2.40	169	2.17	104	1.91	44	1.83[a]	33
21	2.41	171	2.14	96	1.89	41	1.81	31
22	2.42	174	2.11	87	1.87	38	1.79	29
23	2.43	177	2.06	74	1.88	39	1.77	27
24	2.45	182	2.08	79	1.86	37	1.75	26
25	2.47	188	2.51	199	1.86	37	1.73	24
26	2.50	196	2.88	303	2.04	69	1.71	23
27	2.53	205	2.84	292	1.99	58	1.71	23
28	2.55	210	2.77	272	1.96	52	1.70	22
29	2.54	208	2.52	202	2.02	64	1.70	22
30	2.53	205	2.43	177	1.96	52	1.73	24
31	2.51	199			1.93	46	1.74	25

[a] Gauge height interpolated.
[b] No gauge height observations were made previous to this date.

Daily Gauge Height and Discharge of Lee Creek at Layton's Ranche, for 1913.

Day.	September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.74	25.0	1.60	16.5	1.79*a*	29	1.73*a*	20.0
2	1.76	26.0	1.60	16.5	1.80	30	1.72	18.0
3	1.74	25.0	1.59	16.2	1.83	33	1.72*a*	16.0
4	1.72	23.0	1.59	16.2	1.88	39	1.72	14.0
5	1.70	22.0	1.62	17.5	1.84	34	1.72	12.0
6	1.68	21.0	1.66	19.6	1.85	36	1.72	10.0
7	1.67	20.0	1.70	22.0	1.86*a*	37	1.72*a*	9.0
8	1.66	19.6	1.72	23.0	1.87	38	1.73	8.4
9	1.65	19.0	1.76	26.0	1 87*a*	38	1.73*a*	8.4
10	1.65	19.0	1.80	30.0	1.88	39	1.73	8.4
11	1.64	18.5	1.84	34.0	1.90	42	1.74	9.0
12	1.62	17.5	1.90	42.0	1.91	44	1.77	9.0
13	1.62	17.5	2.03	67.0	1.90	42	1.79*a*	9.0
14	1.60	16.5	1.98	55.0	1.90	42	1.81	9.0
15	1.59	16.2	1.94	48.0	1.90	42	1.83	10.0
16	1.58	15.9	1.90	42.0	1.90	42	1.84*a*	10.0
17	1.58	15.9	1.86	37.0	1.89	41	1.85	10.0
18	1.57	15.6	1.89	41.0	1.88	39	1.82	10.6
19	1.60	16.5	1.85*a*	36.0	1.86*a*	31	1.78*a*	10.0
20	1.62	17.5	1.80	30.0	1.85	30	1.75	10.0
21	1.66	19.6	1.80*a*	30.0	1.82	32	1.67*a*	10.0
22	1.80	30.0	1.79	29.0	1.82*a*	32	1.60	9.0
23	1.74	25.0	1.79*a*	29.0	1.81	31	1.55*a*	9.0
24	1.71	23.0	1.78	28.0	1.81*a*	31	1.50	9.0
25	1.68	21.0	1.78	28.0	1.80	30	1.49*a*	9.0
26	1.68	21.0	1.78	28.0	1.79*a*	29	1.48*a*	9.0
27	1.64	18.5	1.78	28.0	1.78	28	1.48	9.0
28	1.63	18.0	1.79	29.0	1.94*c*	48	1.45*a*	8.0
29	1.61	17.0	1.80	30.0	1.84*a*	34	1.42	8.0
30	1.60	16.5	1.80	30.0	1.74	25	1.40	8.0
31	.....	.....	1.79	29.0	.....	.....	1.39*d*	8.0

a Gauge heights interpolated.
c–d Ice conditions, discharges estimated.

Monthly Discharge of Lee Creek at Layton's Ranche, for 1913.

(Drainage area 92 square miles).

Month	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (6-31)	210	112.0	162.0	1.760	1.700	8,355
June	303	74.0	153.0	1.660	1.850	9,104
July	149	37.0	71.9	0.782	0.902	4,421
August	58	22.0	35.8	0.389	0.448	2,201
September	30	15.6	19.9	0.216	0.241	1,184
October	67	16.2	30.8	0.335	0.386	1,894
November	48	25.0	35.6	0.387	0.432	2,118
December	20	8.0	9.4	0.102	0.118	575
The period	.....	.....	.....	.....	6.077	29,852

ST. MARY RIVER AT WHITNEY'S RANCHE.

This station was established on October 13, 1911, by H. R. Carscallen. It is located on the N.E. ¼ Sec. 26, Tp. 7, Rge. 22, W. 4th Mer., near W. D. Whitney's house, and is about ten miles from Lethbridge P. O.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to a post sunk in the bed of the river at the right bank. The zero of the gauge. (elev. 89.15), is referred to a permanent iron bench mark (assumed elev. 100.00), near Mr. Whitney's house.

The channel is straight for 900 feet above and 1,000 feet below the station. The right bank is low and may overflow during flood stage of the stream. The left bank is high, and will not overflow. The bed of the stream is composed of gravel and is not liable to shift.

Discharge measurements are made by means of a cable, car, tagged wire and stay wire. The initial soundings is a spike driven into the downstream sill of the tower on the left bank.

During 1913, the gauge was read by W. D. Whitney.

DISCHARGE MEASUREMENTS of St. Mary River at Whitney's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 18	V. Meek	120.0	170	0.39	1.00	67
Feb. 12	G. F. Deas	110.0	147	0.75	1.19	111
" 28	do	114.0	156	0.76	1.12	119
Mar. 31	do	145.0	180	1.40	0.90	353
April 19	H. O. Brown	216.0	379	3.36	0.85	1,275
May 12	R. Palmer	216.0	344	3.19	0.76	1,099
June 3	do	345.0	1,131	5.01	2.25	5,671
" 21	do	308.0	728	4.12	1.58	3 001
July 9	do	294.0	576	3.87	1.31	2,233
" 28	do	243.0	428	3.19	0.95	1,367
Aug. 19	do	220.0	342	2.73	0.74	934
Sept. 3	do	195.0	279	2.09	0.47	584
" 19	do	137.0	136	2.14	0.25	291
Oct. 7	do	92.0	96	2.10	0.09	201
Nov. 1	do	150.0	180	2.35	0.54	421
Dec. 2	J. E. Degnan	118.0	131	2.16	0.51	283
" 12	do	140.0	134	1.95	0.31	261
" 23	do	118.0	165	0.39	0.04	63

DAILY GAUGE HEIGHT AND DISCHARGE of St. Mary River at Whitney's Ranche, for 1913.

Day	January.		February.		March.		April.		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec. ft.*
1	0.60*b*	140	0.82	62	1.05	112	0.90	460	0.85	1,200	2.25	5,670
2	0 50	130	0.84	64	1.10	107	0.75	570	0.85	1,200	2.25	5,670
3	0.60	128	0.84	67	1.08	113	0.65	680	0.90	1,290	2.31	5,934
4	0.60	125	0.86	75	1.05	120	0.65	790	0.90	1,290	2.28	5,802
5	0.60	118	0.90	85	1.05	114	0.65*c*	900	0.85	1,200	2.23	5,582
6	0.60	111	0.95	90	1.15	114	0.75	1,025	0.85	1,200	2 18	5,362
7	0.60	85	0 98	90	1.10*a*	115	0.80	1,110	0.80	1,110	2.18	5,362
8	0.65	94	1.00	91	1.05*a*	138	0.95	1,390	0.80	1,110	2.18	5,362
9	0 67	102	1.04	99	1.00*a*	162	0.85	1,200	0.80	1,110	2.13	5,142
10	0.69	82	1.07	104	0.95*a*	164	0.90	1,290	0.80	1,110	2.08	4,926
11	0.79	68	1 15	108	0 85*a*	175	0.90	1,290	0.75	1,025	2.08	4,926
12	0 82	65	1.19	111	0.75*a*	186	1.05	1,600	0 75	1,025	2 03	4,716
13	0.84	69	1.19	116	0.65*a*	200	1.05	1,600	0.75	1,025	1.98	4,510
14	0 86	75	1.16	123	0.55*a*	210	1.05	1,600	0.80	1,110	1 93	4,310
15	0 88	62	1.08	128	0.45*a*	194	0.95	1,390	0.85	1,200	1.88	4,114
16	0 88	65	1.04	133	0.35*a*	180	0.90	1,290	0.90	1,290	1 83	3,924
17	0.90	67	1.04	123	0.25	190	0.90	1,290	1.00	1,490	1.78	3,738
18	1.00	67	1.02	119	0.25	212	0 85	1,200	1.05	1,600	1 73	3,558
19	0 90	70	0 99	124	0.20	225	0 85	1,200	1 10	1,710	1.68	3,382
20	0 90	77	0.99	128	0.20	205	0 90	1,290	1 16	1,854	1 63	3,212
21	1.00	88	0 99	130	0.20	217	0 95	1,390	1 20	1,950	1.58	3,046
22	1.01	92	0 99	124	0.20	232	1.05	1,600	1 20	1,950	1.53	2,886
23	1.02	95	1.04	112	0.20	244	1.05	1,600	1.20	1,950	1.53	2,886
24	1.02	100	1.04	120	0 30	260	1 00	1,490	1 22	2,002	1 48	2,730
25	1.05	95	1.07	125	0.30	252	0 90	1,290	1 30	2,210	1 48	2,730
26	1.02	89	1.09	129	0 30	245	0 85	1,200	1.45	2,640	1.53	2,886
27	1.00	83	1.09	126	0.60	262	0 85	1,200	1 65	3,280	1 53	2,886
28	0.98	77	1.14	119	0.45	297	0.85	1,200	2.00	4,590	1 58	3,046
29	0.85	65	.....	.....	0.42	320	0.90	1,290	2.20	5,450	1.63	3,212
30	0.85	68	.....	.....	0.75	336	0.90	1,290	2.20	5,450	1 68	3,382
31	0.83	65	.....	.....	0.90	353	.....	.....	2 20	5,450	.....	.....

a Gauge heights interpolated.
b to c Ice conditions.

Daily Gauge Height and Discharge of St. Mary River at Whitney's Ranche, for 1913 (*Concluded*).

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*
1	1.73	3,558	0.80	1,110	0.45	560	0.00	130	0.60	780	0.55	289
2	1.68	3,382	0.77	1,059	0.46	574	0.05	85	0.60	780	0.55	283
3	1.68	3,382	0.77	1,059	0.47	588	0.10	65	0.60	780	0.60	274
4	1.53	2,886	0.85	1,200	0.45	560	0.10	65	0.55	705	0.60	266
5	1.51	2,822	0.93	1,350	0.42	518	0.15	46	0.55	705	0.60	261
6	1.48	2,730	0.80	1,110	0.40	490	0.05	85	0.51	645	0.60	261
7	1.43	2,580	0.80	1,110	0.35	430	0.09	184	0.50	630	0.55	265
8	1.40	2,490	0.80	1,110	0.35	430	0.10	190	0.50	630	0.45	267
9	1.31	2,238	0.80	1,110	0.35	430	0.10	190	0.50	630	0.40	268
10	1.30	2,210	0.80	1,110	0.30	370	0.15	230	0.50	630	0.35	267
11	1.27	2,132	0.80	1,110	0.30	370	0.25	320	0.50	630	0.35	265
12	1.25	2,080	0.80	1,110	0.30	370	0.35	430	0.50	630	0.35	261
13	1.15	1,830	0.80	1,110	0.30	370	0.45	560	0.50	630	0.30	252
14	1.10	1,710	0.80	1,110	0.28	350	0.60	780	0.50	630	0.25	241
15	1.05	1,600	0.80	1,110	0.28	350	0.60	780	0.50	630	0.20	228
16	1.05	1,600	0.78	1,076	0.28	350	0.60	780	0.45*d*	570	0.20	250
17	1.03	1,556	0.78	1,076	0.25	320	0.65	860	0.45	535	0.45	245
18	0.90	1,290	0.75	1,025	0.25	320	0.65	860	0.50	505	0.40	220
19	0.85	1,200	0.70	940	0.20	270	0.60	780	0.50	475	0.35	180
20	0.80	1,110	0.65	860	0.20	270	0.60	780	0.50	455	0.35	164
21	0.80	1,110	0.60	780	0.18	254	0.60	780	0.50	432	0.19	125
22	0.80	1,110	0.60	780	0.15	230	0.60	780	0.50	410	0.00	85
23	0.80	1,110	0.57	735	0.10	190	0.55	705	0.50	388	0.56	63
24	0.80	1,110	0.55	705	0.10	190	0.55	705	0.50	368	0.65	69
25	0.80	1,110	0.55	705	0.10	190	0.55	705	0.50	352	0.65	75
26	0.80	1,110	0.55	705	0.08	179	0.55	705	0.50	340	0.67	85
27	0.85	1,200	0.50	630	0.08	178	0.60	780	0.50	327	0.08	98
28	0.95	1,390	0.50	630	0.05	160	0.60	780	0.50	317	0.31	111
29	0.95	1,390	0.45	560	0.05	160	0.60	780	0.50	307	0.31	127
30	0.95	1,390	0.45	560	0.05	160	0.60	780	0.55	296	0.32	145
31	0.85	1,200	0.45	560	.....	.....	0.60	780	.....	.....	0.32*c*	130

d to c Ice conditions.

Monthly Discharge of St. Mary River at Whitney's Ranche, for 1913.

(Drainage area 1,394 square miles).

Month.	Discharge in Second Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	140	62	87.6	0.063	0.07	5,386
February	133	62	108.0	0.077	0.08	5,998
March	353	107	201.0	0.144	0.17	12,359
April	1,600	460	1,224.0	0.878	0.98	72,838
May	5,450	1,025	2,002.0	1.440	1.66	123,100
June	5,934	2,730	4,163.0	2.990	3.34	247,715
July	3,558	1,110	1,859.0	1.330	1.53	114,305
August	1,350	560	942.0	0.676	0.78	57,921
September	588	160	339.0	0 243	0 27	20,172
October	860	46	532.0	0.382	0.44	32,711
November	780	296	538.0	0.386	0.43	32,013
December	289	63	197.0	0.141	0.16	12,113
The year	.....	.....	.....	.....	9.91	736,631

MISCELLANEOUS DISCHARGE MEASUREMENTS of St. Mary River drainage basin, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
May 28....	F. R. Burfield...	Boundary Creek...	N.E. 27-1 -26-4..	15.5	22.8	2.02	46
July 19....	do ..	St. Mary River....	S.W. 11-3-25-4...	86.0	351.0	3.24	1137
Oct. 20....	L. Danielsen...	do ...	do .	77.0	322.0	1.77	570
Nov. 3....	do ..	do ...	do .	74.0	292.0	1.55	452

MILK RIVER DRAINAGE BASIN.

General Description.

Milk River rises on the eastern slope of the foothills in the Blackfoot Indian Reserve in the United States. Its headwaters run down in two main streams which are known, after entering Canada, as the north and south branches. The north branch runs in a northeasterly direction through the Blackfoot Reserve for a distance of about 15 miles and then enters Canada near the quarter mound on the south side of Section 3, Township 1, Range 23, West of the Fourth Meridian. From the international boundary the stream continues in a northeasterly direction for about nine miles, when it bends to the east and runs in an easterly direction through the second tier of townships to its junction with the south branch at the centre of Section 20, Township 2, Range 18, West of the Fourth Meridian.

The south branch runs to the south and east of, and parallels the north branch for a distance of about 48 miles, as the crow flies, through the Blackfoot Reserve, and then enters Canada near the quarter mound on the south side of Section 1, Township 1, Range 20, West of the Fourth Meridian. From the international boundary it runs in a northeasterly direction to its junction with the north branch. From the junction of the two branches Milk River runs in an easterly direction through the second tier of townships in Canada to the east boundary of range 7. From this point the river runs in a southeasterly direction to its first point of crossing the international boundary into the United States. This first point of crossing is near the quarter mound on the south side of Section 3, Township 1, Range 5, West of the Fourth Meridian. From this point the river meanders in an easterly direction through Canada and United States to a point on the international boundary about 900 feet west of the east boundary of Section 1, Township 1, Range 5, West of the Fourth Meridian, where it finally crosses into the United States. This point is known as the "Eastern Crossing". The length of the course of Milk River in Canada from the western crossing of the north branch to the eastern crossing is 179 miles. The length of the course of the south branch in Canada is 20 miles.

Throughout its course in Canada from the western crossing of the north branch to the eastern crossing, Milk River runs through a well defined valley bordered on each side by a range of hills. The whole of its watershed in Canada is bald prairie land. The river receives a number of small tributary creeks along its course, all of which discharge a considerable volume of water during the spring freshets; usually they all dry up by about July 1, and have no considerable discharge again until late in the fall, when some of them have a small flow for perhaps a month before the freeze up.

The general conditions of flow in the river are such as are typical of all rivers which have a watershed devoid of tree growth; that is, it is subject to extreme floods during the freshet period and to correspondingly low flow during the summer months. From its headwaters to the eastern crossing the total area of the watershed of Milk River is 2,448 square miles. Of this total amount 1,645 square miles are in Canada and 803 square miles in the United States.

NORTH BRANCH OF MILK RIVER NEAR PETERS' RANCHE.

This station was established by P. M. Sauder and F. H. Peters on July 21, 1909. It was located on the N.E. ¼ Sec. 13, Tp. 1, Rge. 23, W. 4th Mer., but on the installation of an automatic gauge on this stream in May 1913 the gauge was re-located on the N.E. ¼ Sec. 11, Tp. 1, Rge. 23, W. 4th Mer., which is about six miles by trail from Taylorville P. O. and 14 miles from Kimball.

The gauge, which is of the Stevens Continuous type, is installed in a shelter and stilling box on the left bank of the stream. Staff gauges are also installed inside and outside the shelter. The zero of the gauge (elev. 93.58) is referred to a permanent iron bench mark (assumed elev. 100.00) located a few feet upstream from the shelter on the left bank.

The stream flows in one channel which is slightly curved at the gauge. The left bank is high but the right might overflow in flood stages. The bed of the stream is of clay and gravel and is not liable to shift.

Discharge measurements are made at all stages except flood, by wading about 100 yards downstream. During flood stages a small foot bridge some 300 yards below, or the cable and car at the old station may be used.

During 1913, Wm. Wheeler made daily observations at the lower station first and then on the rod outside the shelter as a check on the automatic gauge.

DISCHARGE MEASUREMENTS of North Branch of Milk River near Peter's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec. ft.*
May 2	F. R. Burfield	30.0	33.6	1.47	2.05	49.2
" 20	W. A. Lamb (U.S.G.S.)	31.0	36.0	2.28	2.32	82.0
" 23	F. R. Burfield	31.0	34.0	1.94	2.24	66.0
June 7	do	29.5	23.4	1.51	1.94	35.4
" 14	R. R. Randell (U.S.G.S.)	32.0	23.0	1.30	1.87	30.0
" 24	F. R. Burfield	31.5	22.4	1.30	1.84	29.0
" 26	do	31.0	34.8	2.19	2.31	76.2
July 9	do	20.5	21.9	0.99	1.77	21.7
" 23	do	20.0	20.9	1.04	1.77	21.8
" 28	W. A. Lamb (U.S.G.S.)	30.0	20.0	1.10	1.80	22.0
Aug. 11	F. R. Burfield	20.0	23.0	1.19	1.84	27.3
" 29	do	20.0	20.9	0.87	1.74	18.3
Sept. 13	W. A. Lamb (U.S.G.S.)	23.5	18.0	0.95	1.74	17.1
Oct. 25	W. A. Lamb (U.S.G.S.)	30.0	21	1.10	1.84	23.0
Nov. 25	J. E. Degnan	19.0	15.2	1.80	1.81	27.3
Dec. 6	do	24.0	20.6	0.98	1.76	20.2
" 17	do	20.0	11.8	1.24	1.69	14.6
" 31	do	18.0	11.8	1.19	2.12	14.1



View of the Rating Car at the Current Meter Rating Station at Calgary, Alberta.



General View of the Current Meter Rating Station at Calgary, Alberta.

Daily Gauge Height and Discharge of North Branch of Milk River near Peter's Ranche, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height	Discharge.	Gauge Height.	Discharge.	Gauge Height	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.58	*a*12.6	3.18	17 4	3 69	22	4.02	*c*24	2.03	*e*46	2 04	47
2	2.62	13 0	3.17	17 4	3 66	21	4.07	32	2 05	48	2 01	44
3	2.63	13 0	3.24	17 9	3 68	21	4.06	40	2.12	56	2 00	43
4	2.60	12.8	3.34	18 7	3 71	22	4.13	48	2 02	45	2 00	43
5	2.69	13.5	3.38	19 0	3.82	23	4.43	56	2 01	44	1 96	39
6	2 66	13.3	3.42	19 4	4 03	24	4.55	64	1 99	42	1 95	38
7	2 52	12.2	3.44	19.5	4.64	29	4.85	72	2.07	51	1 95	38
8	2.46	11.7	3.42	19.4	5 26	34	4.96	80	2 04	47	1 96	39
9	2.39	11 1	3.36	18 9	5 41	35	4.76	90	1 98	41	1.95	38
10	2.33	10.6	3.29	18.3	5 22	34	4.85	100	2 00	43	1 99	42
11	2 11	8.9	3 32	18.6	5 05	32	5.26	140	2 15	59	1 96	39
12	2.24	9.9	3 32	18.6	4 54*b*	28	5.74	180	2 14	58	1.98	41
13	2.30	10.4	3 35	18 8	4 04	24	5.48	220	2.13	57	1 90	33
14	2.64	13 1	3 37	19 0	4 03*b*	24	5.03	*c*278	2 08	52	1.89	32
15	2 65	13 2	3 40	19 2	4 01*b*	24	3 97	*d*172	2.07	51	1 87	30
16	2.70	13 6	3.73	22.0	3 99*b*	24	3.07	93	2 15	59	1.85	28
17	2.68	13.4	4.21	26.0	3.97*b*	24	2.99	87	2.32	79	1.84	27
18	2 70	13.6	4 25	26 0	3 95*b*	24	2.84	76	2 40	88	1.84	27
19	2.78	14 2	4 28	26.0	3.93*b*	23	2.78	72	2.44	93	1.88	31
20	2.32	10.6	4.28	26.0	3.91*b*	23	2.76	70	2.32	79	2.08	52
21	2.26	10.1	4.29	26.0	3 89*b*	23	2.50	51	2 28	74	1.91	34
22	2.32	10.6	4.22	26.0	3 87	23	2.21	39	2.29	75	1.85	28
23	2.41	11.3	4.04	24.0	3.84	23	2.10	35	2 23	68	1.85	28
24	2.56	12.5	3.90	23.0	3 82	23	2.01	31	2.18	63	1.84	27
25	2.59	12.7	3.52	20.0	3.83	23	2.07	34	2.17	62	1.95	38
26	2.75	14.0	3.76	22.0	3.83	23	2.04	32	2.18	63	2.10	54
27	2.84	14.7	3.73	22.0	3.87	23	2.01	31	2.18	63	2.25	71
28	2.89	15.1	3.73	22.0	3.94	24	1.98	30	2.16	61	2.29	75
29	2.92	15.4	.....	.....	3.99	24	1.98	30	2.20	65	2.11	55
30	3.06	16.5	.....	.....	3.90	23	2.00	*d*31	2.08	52	2.11	*f*55
31	3.09	16.7	.....	.....	3.90	23	.....	.....	2.05	48	.....	.....

(*a*) Jan. 1 to April 13 ice conditions; discharge estimated.

(*c*) April 14 Stream clear of ice.

(*a*) Jan. 1 to April 30 records from station N. E. 13-1-23-4.

(*e*) May 1 to June 30 records from station N.E. 11-1-23-4.

(*d*) (*f*)

(b) Gauge heights interpolated.

DAILY GAUGE HEIGHT AND DISCHARGE of North Branch of Milk River near Peter's Ranche, for 1913.

DAY.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.99	42.0	1.74	18.7	2.15	24.0	1.87	30	1.83	26	1.75	19.5
2	1.89	32.0	1.73	17.9	2.12	24.0	1.86	29	1.84	27	1.74	18.8
3	1.83	26.0	1.74	18.7	2.11	23.0	1.86	29	1.90	33	1.79	23.0
4	1.88	31.0	1.74	18.7	2.11	24.0	1.87	30	1.95	38	1.76	20.0
5	1.86	29.0	1.74	18.7	2.10	24.0	1.87	30	1.82	26	1.74	18.8
6	1.80	24.0	1.73	17.9	2.10	25.0	1.87	30	1.81	25	1.77	21.0
7	1.78	22.0	1.72	17.0	2.09	25.0	1.87	30	1.80	24	1.73	17.9
8	1.74	18.7	1.84	27.0	2.08	25.0	1.88	31	1.80	24	1.74	18.8
9	1.77	21.0	2.03	46.0	2.07	25.0	1.89	32	1.80	24	1.78	22.0
10	1.75	19.5	1.84	27.0	2.07	25.0	1.90	33	1.79	23	1.79	23.0
11	1.81	25.0	1.84	27.0	2.05	25.0	1.92	35	1.80	24	1.75	19.5
12	1.81	25.0	1.80	24.0	2.03	25.0	2.25	71	1.78	22	1.76	20.0
13	1.78	22.0	1.78	22.0	2.02	25.0	2.09	53	1.90	33	1.78	22.0
14	1.76	20.0	1.81	25.0	2.03	25.0	1.98	41	2.01	44	1.77	21.0
15	1.76	20.0	1.79	23.0	2.01	25.0	1.90	33	1.90	33	1.74	18.8
16	1.76	20.0	1.78	22.0	1.99	25.0	1.88	31	1.78	22	1.74	18.8
17	1.75	19.5	1.79	23.0	2.00	26.0	1.89	32	1.77	21	1.75	19.5
18	1.74	18.7	1.83	26.0	1.99	26.0	1.88	31	1.77	21	1.84	*i* 14.6
19	1.74	18.7	1.80	24.0	2.00	27.0	1.84	27	2.04	47	1.87	14.5
20	1.73	17.9	1.79	23.0	1.98	26.0	1.84	27	1.94	37	1.89	14.5
21	1.73	17.9	1.77	21.0	1.99	27.0	1.80	24	1.84	27	1.79	14.5
22	1.74	18.7	1.75	19.5	2.15	*h* 34.0	1.81	25	1.86	29	1.84	14.5
23	1.77	21.0	1.75	19.5	1.94	37.0	1.79	23	1.83	26	1.85	14.4
24	1.74	18.7	1.74	18.7	1.89	32.0	1.80	24	1.80	24	1.97	14.4
25	1.78	22.0	1.74	18.7	1.82	25.0	1.79	23	1.79	23	2.04	14.3
26	2.02	45.0	1.74	18.7	1.75	19.5	1.78	22	1.84	27	2.06	14.3
27	1.88	31.0	1.74	18.7	1.75	19.5	1.77	21	1.83	26	2.09	14.3
28	1.80	24.0	1.73	17.9	1.75	19.5	1.80	24	1.82	26	2.19	14.3
29	1.80	24.0	1.74	18.7	1.75	19.5	1.80	24	1.80	24	2.14	14.2
30	1.82	26.0	2.15	24.0	1.80	24.0	1.80	24	1.79	23	2.18	14.2
31	1.77	21.0	2.22	*g* 26.0	.....	.....	1.98	41	.....	.....	2.23	*j* 14.1

(*g*) (*h*)
Aug. 30 to Sept. 22. Records taken from station on N.E. 13-1-23-4- owing to fact that automatic gauge was not running.

(*i*) (*j*)
Dec. 18 to Dec. 31. Ice conditions; discharge estimated

MONTHLY DISCHARGE of North Branch of Milk River near Peter's Ranche, for 1913.

(Drainage area 101*a* square miles).

MONTH.	DISCHARGE IN SECOND FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	16.7	8.9	12.7	0.116	0.13	781
February	26.0	17.4	21.1	0.194	0.20	1,172
March	35.0	21.0	24.8	0.228	0.26	1,525
April	278.0	24.0	78.0	0.716	0.80	4,641
May	93.0	41.0	59.1	0.585	0.67	3,634
June	75.0	27.0	40.5	0.401	0.45	2,410
July	45.0	17.9	24.0	0.238	0.27	1,476
August	46.0	17.0	22.2	0.220	0.25	1,365
September	37.0	19.5	25.2	0.250	0.28	1,500
October	71.0	21.0	31.0	0.307	0.35	1,906
November	47.0	21.0	27.6	0.273	0.30	1,642
December	23.0	14.1	17.5	0.173	0.20	1,076
The year	.....	.....	.....	.....	4.16	23,128

a During Jan., Feb., Mar., and Apr., the records are from the station on N. E. 13-1-23-4 and the drainage area used is 109 square miles.

NORTH BRANCH OF MILK RIVER AT KNIGHT'S RANCHE.

This station was established by F. H. Peters and P. M. Sauder on July 17, 1909. It is located in the N.E. ¼ Sec. 18, Tp. 2, Rge. 20, W. 4th Mer., almost directly south of the Knight Sugar Company's Horse-shoe ranche buildings. It is about 33 miles by trail from Kimball.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the right bank. The zero (elev. 90.70) is referred to a permanent iron bench mark (assumed elev. 100.00), situated close to the initial point for soundings.

The stream flows in one channel about 44 feet wide at ordinary stages. It is straight for about 150 feet above and 100 feet below the station. The right bank is composed of clay, is high and not liable to overflow. The left bank is composed of light sandy loam, is low and liable to overflow to quite a distance, during high stages of the stream. The bed of the stream is composed of clay, gravel and boulders.

Discharge measurements are made by means of a cable, car, tagged wire and stay wire. The initial point for soundings is the face of a cedar post on the right bank. Discharge measurements can be made by wading during low water.

During 1913, the gauge was read once a day by W. D. Whitney.

DISCHARGE MEASUREMENTS of North Branch of Milk River at Knight's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 23	G F. Deas	43.4	61.8	1.18	1.75	73.0
May 22	F. R. Burfield	42.5	59.0	1.17	1.68	73.0
June 25	do	41.0	39.4	0.77	1.30	30.2
July 10	do	40.0	38.9	0.60	1.20	23.3
" 24	do	42.0	37.6	0.66	1.22	24.8
Aug. 30	do	42.0	37.1	0.58	1.16	21.5
Oct. 11	L. Danielsen	42.0	39.6	0.76	1.30	30.0
Nov. 19	do	19.0	12.9	0.67	1.42*a*	8.6

a Measurement was taken with a great deal of slush ice in the river.

Daily Gauge Height and Discharge of North Branch of Milk River at Knight's Ranche, for 1913.

Day.	June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.60	61	1 21	24	1.25	27	1.19	23
2			1.40	40	1 19	23	1.20	23	1.19	23
3			1 30	31	1.19	23	1.19	23	1.20	23
4			1 30	31	1.19	23	1.15	21	1.21	24
5			1 25	31	1.23	25	1.15	21	1.22	25
6			1.20	23	1.20	23	1.15	21	1.35	35
7			1.25	27	1.19	23	1.15	21	1.35	35
8			1.20	23	1 24	26	1 15	21	1.35	35
9			1.20	23	1 45	45	1 15	21	1.33	33
10			1.20	23	1 50	50	1 14	20	1.30	31
11			1.25	27	1.55	56	1.15	21	1.30	31
12			1.25	27	1.30	31	1.15	21	1.43	43
13			1.25	27	1.23	25	1.15	21	1.38	38
14			1.20	23	1 24	26	1.18	23	1.33	33
15			1.20	23	1 22	25	1.17	22	1.28	29
16			1.20	23	1.20	23	1.16	22	1.23	25
17			1.20	23	1.20	23	1.16	22	1.20	23
18			1.20	23	1.20	23	1.15	21	1.18	23
19			1.20	23	1 19	23	1.19	23	1.18	23
20			1.20	23	1 19	23	1.22	25	1.18	23
21			1.20	23	1 19	23	1.20	23	1.23	25
22			1.20	23	1.19	23	1.23	25	1.28	29
23			1.20	23	1.19	23	1.35	35	1.28	29
24			1.22	25	1.15	21	1.36	36	1.23	25
25			1.20	23	1.15	21	1.30	31	*b* 1.23	25
26	*a* 1.45	45	1.25	27	1 15	21	1.28	29		
27	1.70	72	1.23	25	1.15	21	1.24	26		
28	1.90	94	1 21	24	1.15	21	1.21	24		
29	1.60	61	1.30	31	1.15	21	1.19	23		
30	1.65	66	1.25	27	1.15	21	1.19	23		
31			1.23	25	1.16	22				

a Observations commenced.
b Observations ended.

Monthly Discharge of North Branch of Milk River at Knight's Ranche, for 1913.

(Drainage area 239 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
June (26-30)	94	45	68	1.41	0.262	674
July	61	23	27	3.46	3.989	1,660
August	56	21	26	3.35	3.862	1,599
September	36	20	24	2.99	3.336	1,428
October (1-25)	43	23	28	2.97	2.762	1,388
The period					14.211	6,749

NORTH BRANCH OF MILK RIVER NEAR MACKIE'S RANCHE.

This station was established July 16, 1909, by P. M. Sauder and F. H. Peters. It is located on the S.W. ¼ Sec. 19, Tp. 2, Rge. 18, W. 4th Mer. It is 17 miles by trail from Milk River, three miles north of Mackie Brothers' buildings and one mile west of the junction of the north and south branches.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the right bank. The zero (elev. 91.50) is referred to a permanent iron bench mark (assumed elev. 100.00), located 25 feet from the edge of the right bank, and under the cable.

The stream flows in one channel, which at ordinary stages is about 60 feet wide. It is straight for 200 feet above and about 150 feet below the station. Both banks of the stream are low and liable to overflow at high stages. The bed of the stream is composed of gravel and is constantly changing.

Discharge measurements are made by means of a cable, car, tagged wire, and stay wire. The initial point for soundings is the face of a cedar post planted in the north bank and marked "0+00".

As it was impossible to secure an observer, the gauge was not read during 1913.

DISCHARGE MEASUREMENTS of North Branch of Milk River near Mackie's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 10	J. E. Degnan	43.5	55.8	0.89	1.97	49.0
June 28	do	65.0	104.0	0.91	2.30	94.0
July 19	do	33.0	28.3	0.90	1.73	26.0
Spet. 12	do	22.5	19.7	0.89	1.60	19.4
Sept. 27	do	26.0	35.2	0.80	1.76	29.0
Oct. 17	do	33.0	30.6	0.93	1.77	28.0
Nov. 1	do	23.0	21.4	1.22	1.72	26.0

SOUTH BRANCH OF MILK RIVER AT CROFF'S RANCHE.

This station was established April 23, 1913, by W. A. Lamb of the United States Geological Survey. It is located in the State of Montana, five miles south of the international boundary at Croff's ranche on the Blackfoot Indian Reservation. It is on the S.W. ¼ Sec. 29, Tp. 37, N., Rge. 9, W., of Montana Principal Meridian, and is in line with the road allowance between ranges 21 and 22, west of the 4th Meridian in Canada.

The gauge is a Stevens continuous automatic gauge set in a wooden shelter three feet wide, four feet long and six feet high. It is set by a staff gauge in the float chamber, the bottom of the record paper being equal to one foot on the staff gauge. Both gauges are checked by the old chain gauge 15 feet downstream. The zero of the gauge (elev. 87.08) is referred to the top of an iron pipe (assumed elev. 100.00), set in the ground 15 feet back from the gauge shelter.

The channel is straight for 350 feet above and 600 feet below the station. The right bank is clear and will not overflow; the left bank is fairly high and clear and may overflow at flood stages. The bed of the stream is of gravel, covered with mud where the current is not swift; it is not likely to shift. There is one channel at all stages.

Discharge measurements during high stages are made by means of a cable and car situated 150 feet upstream from the gauge. During ordinary stages measurements are made by wading at the gauge. The initial point for soundings is the middle of the river side of the gauge house.

DISCHARGE MEASUREMENTS of South Branch of Milk River at Croff's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 23	W. A. Lamb (U.S.G.S.)	73.0	94.0	2.84	3.95	267.0
May 20	do	74.0	127.0	3.50	4.43	445.0
May 21	F. R. Burfield	77.0	122.0	3.06	4.14	373.0
May 21	W. A. Lamb (U.S.G.S.)	76.5	117.0	3.16	4.14	370.0
June 15	R. R. Randell (U.S.G.S.)	57.0	66.0	2.24	3.41	148.0
June 25	F. R. Burfield	73.0	52.3	1.95	3.14	102.0
July 9	do	48.0	61.0	1.33	2.99	81.0
July 23	do	47.0	50.2	1.00	2.80	50.1
July 27	J. M. Ray (U.S.G.S.)	56.0	53.0	1.64	3.05	87.0
Aug. 29	F. R. Burfield	37.0	38.2	0.56	2.54	21.2
Sept. 10	W. A. Lamb (U.S.G.S.)	21.0	14.1	1.28	2.48	18.1
Oct. 12	L. Danielsen	56.0	46.2	0.63	2.90	29.2
Nov. 18	do	55.0	41.2	0.97	2.80	39.9
Dec. 20	W. A. Lamb (U.S.G.S.)	18.0	11.7	1.02	2.45	11.9

Daily Gauge Height and discharge of South Branch of Milk River at Croff's Ranche, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			3.60	196	4.02	315	3.50	173
2			3.64	206	3.94	289	3.35	141
3			3.80	248	3.90	277	3.27	125
4			3.67	214	3.84	260	3.25	122
5			3.60	196	3.75	234	3.27	125
6			3.59	194	3.69	218	3.20	112
7			3.68	216	3.63	204	3.12	98
8			3.74	232	3.57	189	3.08	92
9			3.63	204	3.55	184	3.04	85
10			3.60	196	3.58	191	2.98	76
11			3.78	243	3.61	198	3.00	79
12			4.00	308	3.52	178	3.05	85
13	5.55	864	4.01	311	3.45	162	3.01	81
14	5.50	845	4.00	308	3.40	151	2.97	74
15	5.20	734	3.93	286	3.40	151	2.92	67
16	5.05	678	3.88	271	3.36	143	2.90	64
17	4.60	516	4.16	361	3.30	131	2.86	58
18	4.45	462	4.10	341	3.27	125	2.85	57
19	4.80	588	4.54	494	3.27	125	2.83	54
20	4.75	570	4.40	445	3.37	145	2.80	50
21	4.80	588	4.17	365	3.38	147	2.81	51
22	4.65	534	4.16	361	3.24	120	2.80	50
23	3.90	277	4.24	389	3.21	114	2.80	57
24	3.90	277	4.18	368	3.21	114	2.76	50
25	3.80	248	4.17	365	3.15	104	2.72	50
26	3.80	248	4.22	382	3.36	143	2.77	50
27	4.13	351	4.30	410	4.05	324	3.05	87
28	4.11	344	4.32	417	4.23	386	2.92	67
29	3.93	286	4.26	396	4.04	321	2.88	61
30	3.66	211	4.19	372	3.71	224	2.86	58
31			4.08	334			2.86	58

SESSIONAL PAPER No. 25c

Daily Gauge Height and Discharge of South Branch of Milk River at Croff's Ranche, for 1913.

Day.	August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.80	50	2.58	25.0	2.55	22	.....	*b*25	2.66	34.0
2	2.76	45	2.57	24.0	2.55	22	.....	25	2.60	27.0
3	2.72	40	2.56	23.0	2.57	24	.....	25	2.62	29.0
4	2.73	49	2.53	21.0	2.68	36	.....	25	2.61	28.0
5	2.71	39	2.52	20.0	2.71	39	.....	25	2.63	30.0
6	2.70	38	2.48	16.6	2.70	38	.....	25	2.67	35.0
7	2.75	44	2.47	15.9	2.74	43	.....	25	2.63	30.0
8	2.77	46	2.47	15.9	2.77	46	.....	25	2.60	27.0
9	2.96	73	2.46	15.2	2.88	61	.....	25	2.60	27.0
10	3.15	104	2.47	15.9	2.76	45	.....	25	2.56	23.0
11	3.05	87	2.48	17.0	2.79	49	.....	25	2.63	*c*15.0
12	2.89	63	2.51	19.0	2.90	64	.....	25	2.65	15.0
13	2.81	51	2.48	17.0	3.30	131	.....	25	2.69	15.0
14	2.81	51	2.49	17.0	3.20	112	.....	25	2.69	15.0
15	2.83	54	2.50	18.0	2.95	72	.....	25	2.65	15.0
16	2.80	50	2.50	18.0	2.80	50	.....	25	2.66	15.0
17	2.78	48	2.50	18.0	2.80	50	.....	*b*25	2.62	15.0
18	2.78	48	2.50	18.0	2.60	27	2.75	44	2.60	15.0
19	2.80	50	2.54	22.0	2.70	38	2.80	50	2.55	15.0
20	2.76	45	2.55	22.0	2.90	64	2.52	20	2.50	15.0
21	2.70	38	2.58	25.0	3.15	204	2.60	27	.....	15.0
22	2.68	36	2.62	29.0	3.26	123	2.65	32	.....	15.0
23	2.64	31	2.70	38.0	3.07	90	2.71	39	.....	15.0
24	2.60	27	2.72	40.0	2.81	51	2.77	46	.....	15.0
25	2.58	25	2.70	38.0	2.67	35	2.81	51	.....	15.0
26	2.57	24	2.65	32.0	2.70	38	2.79	49	.....	15.0
27	2.57	24	2.62	29.0	2.70	38	2.74	43	.....	15.0
28	2.57	24	2.60	27.0	2.64	31	2.68	36	.....	15.0
29	2.56	23	2.56	23.0	2.58	25	2.67	35	.....	15.0
30	2.55	22	2.55	22.0	2.60	25	2.70	38	.....	15.0
31	2.55	22	.....	.....	*a*2.60	25	.....	.....	.....	*c*15.0

a Gauge height interpolated.
b Discharge estimated Nov. 1-17.
c Discharge estimated Dec. 11-31.

Monthly Discharge of South Branch of Milk River at Croff's Ranche, for 1913.

(Drainage area 315 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
April (13-30)	864	211.0	479.0	1.520	1.02	17,101
May	494	194.0	311.0	0.987	1.14	19,123
June	386	104.0	196.0	0.622	0.69	11,663
July	173	50.0	79.0	0.252	0.29	4,858
August	104	22.0	44.0	0.140	0.16	2,705
September	40	15.2	22.7	0.072	0.08	1,351
October	131	22.0	52.2	0.166	0.19	3.210
November	50	20.0	31.2	0.099	0.11	1,856
December	37	15.0	19.5	0.062	0.07	1,199
The period	.....	.....	.....	.....	3.75	63,066

SOUTH BRANCH OF MILK RIVER AT MACKIES' RANCHE.

This station was established July 14, 1909, by P. M. Sauder and F. H. Peters. It is 17 miles by trail from Milk River and is located on the N.W. ¼ Sec. 31, Tp. 1, Rge. 18, W. 4th Mer., about one quarter mile upstream from Mackie Brothers' ranche buildings, and is about five miles upstream from the junction of the north and south branches of Milk River.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the left bank. The zero of the gauge (elev. 86.60) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank, directly under the cable and five feet from the initial point of soundings.

The stream flows in one channel and is straight for about 150 feet above the station and for 100 feet below. The right bank is composed of sand and gravel and is liable to overflow. The left bank is composed of clay and is high. The bed of the stream consists of gravel and sand and is liable to shift.

Discharge measurements are made during high stages by means of a cable, car, tagged wire and stay wire, and at low stages by wading. The initial point for soundings is the face of a cedar post planted in the left bank.

During 1913, the gauge was read by Mrs. F. Cathro.

DISCHARGE MEASUREMENTS of South Branch of Milk River at Mackies' Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 8	J. E. Degnan	87	146.0	1.66	3.27	243.0
May 21	do	90	198.0	2.02	3.74	402.0
June 9	do	87	140.0	1.38	3.11	194.0
June 28	do	89	185.0	1.87	3.58	347.0
July 18	do	68	73.7	0.76	2.42	55.9
Aug. 1	do	66	71.2	0.74	2.40	52.6
Aug. 23	do	31	34.0	0.97	2.20	32.9
Sept. 11	do	24	27.0	0.50	1.97	14.7
Sept. 26	do	32	34.4	1.08	2.24	37.3
Sept. 28	do	38	44.4	0.63	2.18	28.1
Oct. 16	do	42	94.4	0.91	2.60	86.1
Oct. 31	do	67	38.8	1.01	2.67	39.4

DAILY GAUGE HEIGHT AND DISCHARGE of South Branch of Milk River at Mackies' Ranche for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			3.54	332.	3.62	359.
2			3 42	291.	3.60	352.
3			3.33	262.	3.55	335.
4			3.25	236.	3.44	298.
5			3.16	208.	3.38	278.
6	3.94	474	3.08	185.	3.33	262.
7	3.97	485.	3.09	188.	3.27	242.
8	3.99	492.	3 27	242.	3.23	230.
9	4.05	514.	3 28	246.	3.11	194.
10	*a* 5.64	500.	3.27	242.	3.08	185.
11	*a* 6.15	500.	3.22	226.	3.06	180.
12	*a* 6.24	300.	3 20	220.	3.05	177.
13	3.00	163.	3.40	284.	3.03	171.
14	3.00	163.	3.50	318.	3 03	171.
15	3.00	163.	3.60	352.	3.01	166.
16	*b*	400.	3.82	431.	3.00	163.
17	*b*	550.	3.70	388.	2.98	158.
18	4.16	554.	3 71	392.	2.95	150.
19	4.15	550.	3 89	456.	2 97	155.
20	4.14	546.	3.89	456.	2 96	153.
21	4.12	539.	3.74	402.	2 95	150.
22	4.12	539.	3.71	392.	2.88	134.
23	4.10	532.	3.69	384.	2.79	114.
24	3.91	464.	3.68	381.	2.75	106.
25	3.86	446.	3.69	384.	2.77	110.
26	3.77	413.	3.70	388.	2 78	113.
27	3.66	374.	3.71	392.	2.96	153.
28	3.64	366.	3.76	410.	3.65	370.
29	3.65	370.	3.75	406.	3.79	420.
30	3.64	366.	3.73	399.	3.80	424.
31			3.70	388.		

a Ice jam.
b Gauge rod carried out by ice.

Daily Gauge Height and Discharge of South Branch of Milk River at Mackies' Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.62	359.	2.40	53.	2.02	17.6	2.18	30.0
2	3.50	318.	2.40	53.	2.02	17.6	2.17	30.0
3	3.38	278.	2.39	52.	2.01	16.8	2.17	30.0
4	3.20	220.	2.27	39.	2.01	16.8	2.19	31.0
5	3.09	188.	2.33	45.	2.00	16.0	2.22	34.0
6	2.98	158.	2.31	43.	2.00	16.0	2.33	45.0
7	2.90	138.	2.31	43.	1.98	14.8	2.35	47.0
8	2.83	123.	2.44	58.	1.91	10.6	2.40	53.0
9	2.75	106.	2.56	75.	1.89	9.6	2.42	55.0
10	2.64	87.	2.73	102.	1.89	9.6	2.51	67.0
11	2.50	66.	2.75	106.	1.97	14.2	2.53	70.0
12	2.47	62.	2.68	94.	1.97	14.2	2.53	70.0
13	2.46	60.	2.70	97.	1.96	13.6	2.54	72.0
14	2.44	58.	2.74	104.	1.95	13.0	2.64	87.0
15	2.43	57.	2.71	99.	1.95	13.0	2.91	140.0
16	2.43	57.	2.61	83.	1.95	13.0	2.67	92.0
17	2.42	55.	2.48	63.	1.95	13.0	2.59	79.0
18	2.42	55.	2.30	42.	1.96	13.6	2.57	76.0
19	2.41	54.	2.29	41.	1.97	14.2	2.54	72.0
20	2.40	53.	2.26	38.	1.96	13.6	2.54	72.0
21	2.39	52.	2.24	36.	1.97	14.2	2.49	65.0
22	2.39	52.	2.23	35.	2.00	16.0	2.52	69.0
23	2.37	49.	2.20	32.	2.11	25.0	2.51	67.0
24	2.36	48.	2.18	30.	2.14	27.0	2.54	72.0
25	2.36	48.	2.15	28.	2.17	30.0	2.55	73.0
26	2.35	47.	2.13	26.	2.24	36.0	2.39	79.0
27	2.34	46.	2.11	25.	2.19	31.0	2.61	83.0
28	2.34	46.	2.09	23.	2.19	31.0	2.64	87.0
29	2.42	55.	2.06	21.	2.18	30.0	2.65	89.0
30	2.42	55.	2.05	20.	2.18	30.0	2.68	94.0
31	2.41	54.	2.03	18.	.....	.....	2.67	92.0

Monthly Discharge of South Branch of Milk River at Mackies' Ranche, for 1913.

(Drainage area 441 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (6-30)	554	163	430	0.975	0.91	21,323
May	456	185	332	0.753	0.87	20,414
June	424	106	216	0.490	0.55	12,853
July	359	46	100	0.227	0.26	6,148
August	106	18	51.3	0.118	0.14	3,216
September	36	9.6	18.4	0.042	0.05	1,095
October	140	30	68.4	0.155	0.18	4,206
The period	.....	.....	.....	.....	2.96	69,255

MILK RIVER AT MILK RIVER.

This station was established by H. C. Ritchie on May 18, 1909, and re-established by F. H. Peters on July 3, 1909. It is located on the N.E. ¼ Sec. 21, Tp. 2, Rge. 16, W. 4th Mer., at the Canadian Pacific Railway bridge, one quarter of a mile south of the town of Milk River.

The gauge, which is of the standard chain type, is securely fastened to the railway bridge, above the centre of the stream. The zero of the gauge (elev. 90.97) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank, 20 feet upstream from the bridge and 30 feet from the bank.

The stream flows in one channel at all stages and in ordinary stages is not more than 140 feet wide. The channel is almost straight for 500 feet above and below the station. The right bank is sandy, fairly high, and not liable to overflow. The left bank is lower and overflows during high water. The bed of the stream is composed of sand and fine gravel which is constantly shifting.

Discharge measurements are made from the downstream side of the bridge at high water, and in low water a wading section about 50 feet upstream is used.

During 1913, the gauge was read by Dan O'Connell.

DISCHARGE MEASUREMENTS of Milk River at Milk River, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 27	G. F. Deas	23.	17.5	0.39	2.32	7.0
Feb. 11	do	23.	15.9	0.66	2.30	10.6
Feb. 27	do	40.	9.3	0.80	3.55	7.4
April 11	J. E. Degnan	125.	470.	2.34	4.60	1,102.0
April 14	do	148.	523.	3.57	4.92	1,870.0
April 21	do	135.	298.	2.77	3.29	825.0
May 9	do	119.	172.	1.86	2.32	321.0
May 21	do	130.	258.	2.42	3.03	625.0
May 22	do	122.	217.	2.10	2.69	455.0
June 8	do	130.	162.	1.54	2.04	250.0
June 11	do	130.	151.	1.63	1.98	245.0
June 26	do	104.	132.	1.31	1.78	173.0
June 30	do	123.	238.	2.08	2.71	495.0
July 15	do	130.	96.0	1.13	1.45	109.0
July 20	do	129.	80.8	1.08	1.32	88.0
Aug. 1	do	128.	75.7	1.11	1.28	84.0
Aug. 2	do	128.	76.8	1.07	1.31	82.0
Aug. 20	do	128.	76.1	0.93	1.32	76.0
Aug. 21	do	35.0	43.2	1.16	1.18	50.1
Sept. 10	do	33.0	36.0	0.92	1.10	33.1
Sept. 13	do	32.0	36.2	0.93	1.09	34.0
Sept. 24	do	35.0	41.8	1.24	1.18	52.0
Sept. 29	do	35.0	42.8	1.26	1.27	54.0
Oct. 15	do	63.0	99.8	1.75	1.88	175.0
Oct. 18	do	61.0	79.3	1.13	1.48	89.0
Nov. 1	do	61.0	77.5	1.10	1.41	85.0
Nov. 13	do	63.0	94.2	0.61	1.755	57.0
Dec. 1	do	62.0	67.8	0.82	1.43	56.0
Dec. 11	do	63.0	40.7	0.82	1.59	33.0
Dec. 22	do	62.0	21.6	0.52	1.38	11.0

Daily Gauge Height and Discharge of Milk River at Milk River, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.90	7.0*d*	2.63	8.2	3.40	7.0	3.90	77	2.25	308	2.45	376
2	1.94	7.0	2.63	8.6	3.55	7.0	4.20	150	2.24	305	2.45	376
3	1.94	7.0	2.60	8.9	3.52	7.0	3.90	100	2.26	311	2.35	340
4	1.94	7.0	2.50	9.1	3.56	7.0	4.48	200	2.27	314	2.33	334
5	2.00	7.0	2.38	9.4	3.60	7.0	4.45	190	2.27	314	2.25	308
6	2.00	7.0	2.55	9.6	3.65	7.0	*b*5.35	410	2.20	292	2.20	292
7	1.80	7.0	2.30	9.8	3.75	7.0	*b*5.46	570	2.19	289	2.15	276
8	1.70	7.0	2.35	10.1	4.15	7.0	*b*5.35	650	2.21	295	2.03	238
9	1.70	7.0	2.40	10.3	4.15	7.0	*b*4.85	730	2.26	311	2.00	230
10	1.75	7.0	2.63	10.6	4.20	7.0	*b*5.70	1,100*d*	2.19	289	1.99	227
11	1.70	7.0	2.33	10.6	5.03	7.0	*c*4.66	1,140	2.15	276	1.99	227
12	1.70	7.0	2.40	9.2	5.20	7.0	*c*4.73	1,380	2.33	334	1.99	227
13	1.70	7.0	2.54	9.0	4.03	7.0	*c*5.15	1,838	2.60	434	1.97	222
14	1.70	7.0	3.00	8.8	3.85	7.0	4.95	1,888	2.60	434	1.92	208
15	1.70	7.0	3.30	8.6	3.77	7.0	4.35	1,490	2.54	410	1.87	196
16	1.70	7.0	3.35	8.4	3.85	7.0	4.00	1,259	2.55	414	1.82	184
17	1.70	7.0	3.50	8.1	3.75	7.0	3.94	1,219	*a*2.65	454	1.77	172
18	1.70	7.0	3.35	7.9	3.70	7.0	3.45	896	*a*2.75	498	1.75	167
19	1.70	7.0	3.35	7.7	3.70	7.0	3.30	801	2.85	544	1.71	157
20	1.70	7.0	3.43	7.5	3.64	7.0	3.40	864	3.27	782	1.77	172
21	1.70	7.0	3.30	7.3	3.55	7.0	3.35	832	2.97	606	1.85	191
22	1.75	7.1	3.45	7.1	3.45	7.0	3.31	807	2.64	450	1.93	211
23	1.83	7.2	3.50	7.8	3.49	7.0	3.10	679	2.64	450	1.85	191
24	1.80	7.3	3.55	7.6	3.50	7.0	2.66	458	2.70	476	1.75	167
25	1.83	7.4	3.40	7.4	3.45	7.0	2.57	422	2.65	454	1.77	172
26	1.83	7.5	3.65	7.2	3.45	7.0	2.50	394	2.63	446	1.76	169
27	2.32	7.6	3.55	7.4	3.45	7.0	2.46	380	2.66	458	2.05	244
28	2.73	7.7	3.45	7.0	3.45	7.0	2.86	549	2.75	498	2.60	434
29	2.73	7.8	.....	.....	3.45	7.0	2.70	476	2.77	507	2.81	525
30	2.70	7.9	.....	.....	3.40	7.0	2.50	394	2.70	476	2.60	434
31	2.70	8.0	.....	.....	3.58	7.0	.....	.....	2.58	426	.....	.....

b Ice breaking up.
a Gauge heights interpolated.
c Floating and slush ice.
d Jan. 1st to April 10th, ice conditions; discharge estimated.

Daily Gauge Height and Discharge of Milk River at Milk River, for 1913.
(Concluded.)

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2 34	337	1.30	74	1 12	39	1 16	41	1 42	82	1 43	57
2	2.09	257	1 30	74	1 15	44	1 08	32	1 48	92	1 46	56
3	1 88	198	1 25	64	1 11	38	1 11	35	1 44	85	1 53	64
4	1 79	177	1 20	54	1 10	36	1 20	46	1 43	83	1 46	48
5	1 70	155	1.28	70	1 08	33	1 30	61	1 48	92	1 47	46
6	1 67	148	1 20	54	1 12	39	1 31	63	1 49	94	1 56	56
7	1.65	144	1 16	46	1 09	34	1 40	78	1 45	87	1 50	38
8	1.60	134	1 20	54	1 08	33	1 31	63	1 35	69	*a*1 53	38
9	1 52	118	1 31	76	1 07	31	1 35	69	1 36	71	1 56	38
10	1.50	114	1 55	124	1 08	33	1 38	74	1 34	67	1 62	42
11	1.50	114	1.65	144	1 10	34	1 39	76	1 38	74	1 59	33
12	1 48	110	1 75	167	1.10	34	*a*1 53	101	*d*1 37	73	1 60	33
13	1 48	110	1 50	114	1 05	28	*a*1 67	129	*d*1 73	52	1 65	40
14	1 50	114	1 40	91	1 09	33	*a*1 80	156	*d*1 68	48	1 66	41
15	1.43	100	1 39	92	1.10	31	1.93	185	*d*1 57	35	1 70	47
16	1 37	88	1 37	88	1 10	34	*a*1.78	152	*a*1 55	35	1 70	47
17	1 36	86	1 38	90	1 10	34	*a*1 63	121	*a*1 53	35	1 70	47
18	1 35	84	1 35	84	1 10	34	1.48	92	*a*1 51	35	1 65	40
19	1 31	82	*a*1 33	80	1 11	35	1 45	87	*a*1 49	34	1 57	29
20	1.30	74	1.31	76	1 09	33	1 46	89	*a*1 47	33	1 49	19
21	1 30	74	1 31	76	1 07	30	1 45	87	*a*1 45	33	1 43	15
22	1 35	84	1 30	74	1.23	50	1.44	85	*a*1.43	34	1 38	12
23	1.30	74	1 25	64	1 21	47	1.43	83	1.41	33	1 50	21
24	1.28	70	1 20	54	1 23	50	1.43	83	1.35	28	1 47	18
25	1.28	70	1.20	54	1.35	69	1.41	80	1.42	32	1.65	40
26	1.27	68	1 15	44	1.38	74	1.40	73	1.55	62	1 70	47
27	1.32	78	1.15	44	1.30	61	1.50	96	1.62	81	1.80	65
28	1.40	94	1.12	39	1.28	58	1.49	94	1.58	75	1.90	88
29	1 48	110	1.10	36	1.25	53	1.41	80	1.55	74	1.74	58
30	1.55	124	1.10	36	1.21	47	1.38	74	1.50	72	1.85	77
31	1.30	74	1.10	36			1.55	105			1.95	102

a Gauge height interpolated.
d Ice and slush ice.

Monthly Discharge of Milk River at Milk River, for 1913.

(Drainage area 1,077 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	8.0	7.0	7.18	0 007	0.01	441
February	10.6	7.0	8.54	0.007	0 01	474
March	7.0	7.0	7.00	0 006	0 01	430
April	1,888.0	77.0	745.00	0.692	0.77	44,331
May	782.0	276.0	415 00	0 385	0.44	25,517
June	525.0	157.0	256 00	0 238	0 26	15,233
July	337.0	68.0	118.00	0 110	0 13	7,256
August	167.0	36.0	73.40	0 068	0 08	4,513
September	74 0	28.0	41.10	0.038	0 04	2,446
October	185.0	32.0	86.90	0 810	0 09	5,334
November	94 0	32.0	60.00	0 056	0 06	3,570
December	102 0	12.0	45.20	0.042	0 05	2,779
The year					1 95	112 333

MILK RIVER AT WRITING-ON-STONE POLICE DETACHMENT.

This station was established on August 2, 1909, by F. H. Peters. It is located at Writing-on-stone R.N.W.M.P., detachment, in the S.W. ¼ Sec. 35, Tp. 1, Rge. 13, W. 4th Mer. It is 17 miles by trail from Coutts and 25 miles from Milk River station.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the right bank. The zero (elev. 86.13) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank directly under the cable and one foot north of the tower.

The river flows in one channel at all stages. It is straight for 300 feet above and 250 feet below the station. Both banks are slightly wooded, high and not liable to overflow except in extreme flood stages of the stream. The bed of the stream is composed of sand which is constantly shifting.

Discharge measurements are made during high water by means of a cable, car, tagged wire and stay wire, and at low stages by wading. The initial point for soundings is 50 feet south of a post on the right bank and marked "50".

During 1913, the gauge was read by Constable A. P. White.

DISCHARGE MEASUREMENTS of Milk River at Writing-on-Stone, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24	J. E. Degnan	129	261.0	2.30	3.50	602.0
May 4	do	126	175.0	2.07	2.95	364.0
May 12	do	125	139.0	1.97	2.64	273.0
May 20	do	127	252.0	2.23	3.48	561.0
May 26	do	127	239.0	1.84	3.20	439.0
June 6	do	126	164.0	2.01	2.82	330.0
June 12	do	127	169.0	1.56	2.57	264.0
June 24	do	126	117.0	1.61	2.32	189.0
June 25	do	124	113.0	1.52	2.30	172.0
July 2	do	127	177.0	2.01	2.89	355.0
July 11	do	69	58.2	1.92	2.04	112.0
July 21	do	69	55.2	1.49	1.85	82.5
July 30	do	70	73.9	1.40	1.98	103.6
Aug. 6	do	69	52.7	1.26	1.71	66.5
Aug. 19	do	70	56.9	1.40	1.87	79.8
Aug. 27	do	31	27.0	1.61	1.66	43.5
Sept. 6	do	32	27.8	1.58	1.65	43.8
Sept. 15	do	30	30.6	1.13	1.58	34.4
Sept. 22	do	32	34.5	1.28	1.67	44.2
Oct. 1	do	30	35.2	1.47	1.74	51.7
Oct. 13	do	72	57.7	1.37	1.91	79.1
Oct. 20	do	73	61.9	1.44	1.96	89.0
Oct. 29	do	72	59.8	1.28	1.89	76.1
Nov. 4	do	71	54.5	1.25	1.78	68.1
Nov. 10	do	72	60.2	1.26	1.86	75.1

Daily Gauge Height and Discharge of Milk River at Writing-on-Stone, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	[b]	70.	3.04	402.	3.05	406.	3.11	428.
2		100.	2.83	332.	3.13	435.	2.89	351.
3		180.	2.73	300.	2.98	381.	2.74	303.
4		250.	2.90	354.	2.95	370.	[a]2.54	242.
5		230.	3.10	424.	2.88	348.	2.35	189.
6		410.	2.82	328.	2.81	325.	2.33	183.
7		580.	2.65	275.	2.74	303.	2.27	167.
8		700.	2.73	300.	2.73	300.	2.24	160.
9		780.	2.74	303.	2.67	281.	2.15	138.
10		1,000	2.85	338.	2.64	272.	2.22	155.
11		1,100.	2.72	296.	2.66	278.	2.05	114.
12		1,500.	2.64	272.	2.67	281.	2.05	115.
13	5.65	1,880.	2.80	322.	2.68	284.	2.03	112.
14	5.54	1,808.	3.02	395.	2.53	239.	2.03	113.
15	5.05	1,468.	3.06	410.	2.45	217.	2.05	118.
16	5.35	1,674.	3.13	435.	2.36	192.	2.00	109.
17	5.10	1,434.	3.05	406.	2.31	178.	1.98	103.
18	4.25	920.	3.25	478.	2.28	170.	1.94	98.
19	4.05	782.	3.34	510.	2.33	183.	1.94	99.
20	4.03[b]	768.	3.45	550.	2.35	189.	1.92	96.
21	3.98	741.	3.63	615.	2.30	175.	1.85	82.
22	3.90	712.	3.54	582.	2.35	189.	1.85	84.
23	3.66	626.	3.22	467.	2.45	217.	1.85	82.
24	3.53	579.	3.25	478.	2.33	183.	1.85	81.
25	3.15	442.	3.33	507.	2.32	281.	1.85	80.
26	3.02	395.	3.22	467.	2.25	162.	1.84	77.
27	2.95	370.	3.18	453.	2.64	272.	1.84	77.
28	2.95	370.	3.27	485.	2.58	254.	1.82	72.
29	2.35	189.	3.24	474.	3.25	478.	[a]1.91	89
30	3.23	471.	3.20	460.	3.35	514.	2.00	108.
31			3.19	456.			1.93	93.

a Gauge heights interpolated.
b April 1st to April 20th ice breaking up; discharge estimated.

Daily Gauge Height and Discharge of Milk River at Writing-on-Stone, for 1913.

Day.	August.		September.		October.		November.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.82	71.	1.70	52.	1.76	55.	1.84	73.
2	1.82	71.	1.71	54.	1.76	55.	1.79	66.
3	1.82	71.	1.69	51.	1.75	54.	1.74	59.
4	1.80	66.	1.70	53.	1.75	52.	1.42	12.
5	1.84	74.	1.66	45.	1.78	58.	*a*1.74	60.
6	1 73	52.	1.65	44.	1.88	76.	2.05	122.
7	1.74	54.	1.65	44.	1.90	80.	*a*2.08	127.
8	1.75	56.	1.65	44.	1.90	79.	2.10	130.
9	1.74	54.	1.67	48.	1.95	89.	1.90	84.
10	1.81	69.	1.60	38.	1 92	82.	1.84	72.
11	1.89	84.	1.60	38.	1 93	84.	1.85	73.
12	2.17	143.	1.59	36.	1.92	82.	1.83	70.
13	2.17	143.	1.58	35.	1.94	85.	1.87	77.
14	2.05	118.	1.60	37.	1.94	85.	1.95	93.
15	1.95	97.	1.60	37.	2.13	125.	1.86	75.
16	1.87	80.	1.63	40.	2.18	136.	2.07	118.
17	1.85	76.	1.59	35.	2.23	146.	2.00	104.
18	*a*1.90	86.	1.59	36.	2.14	127.	2.00	104.
19	1.95	97.	1.64	41.	1.95	87.	1.86	71.
20	1.87	81.	1.65	42.	1.96	89.	1.63	40.
21	1.80	68.	1.65	42.	1.95	87.	1.60	36.
22	1.79	66.	1.69	47.	1.95	87.	1.45	22.
23	1.82	73.	1.74	54.	1.89	75.	1.45	22.
24	1.76	61.	1.75	58.	1.84	66.	1.48	24.
25	1.72	54.	1.75	57.	1.85	68.	1.60	37.
26	1.70	50.	1.84	75.	1.76	50.	1.57	33.
27	1.69	47.	1.84	74.	*a*1.81	60.	1.55	31.
28	1.69	48.	1.83	72.	1.87	72.	1.45	22.
29	1.67	45.	1.78	61.	1.95	88.	1.48	24.
30	1.65	43.	1.75	54.	1.92	84.	1.62	39.
31	1.68	48.	.....	.....	1.66	37.	.....	.....

a Gauge heights interpolated.

Monthly Discharge of Milk River at Writing-on-Stone, for 1913.

(Drainage area 1,620 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total Acre-feet.
April	1,880.	70.	751.0	0.464	0.520	44,688
May	615.	272.	415.0	0.256	0.300	25,517
June	514.	162.	279.0	0.172	0.190	16,602
July	428.	72.	139.0	0.086	0.100	8,547
August	143.	43.	72.5	0.045	0.052	4,458
September	75.	35.	48.1	0.030	0.033	2,862
October	146.	37.	80.6	0.050	0.058	4,956
November	130.	22.	64.0	0.040	0.045	3,808
The period					1.298	111,438

MILK RIVER AT PENDANT D'OREILLE POLICE DETACHMENT.

This station was established by F. H. Peters on August 5, 1909. It is located 300 feet upstream from the buildings of the police post on the S.W. ¼ Sec. 21, Tp. 2, Rge. 8, W. 4th Mer., and is about 61 miles by trail from Milk River station.

The gauge, which is a plain staff graduated to feet and hundredths, is at the left bank about 80 feet downstream from the cable. The zero (elev. 82.45) is referred to a permanent iron bench mark (assumed elev. 100.00), located directly under the cable, about five feet from the tower on the left bank.

The river flows in one channel, which at ordinary stages is about 150 feet wide. It is straight for about 400 feet above and 300 feet below the station. The right bank is low covered with small willows, and liable to overflow at high stages. The left bank is high, almost clear and not liable to overflow. The bed of the stream is composed of sand and is constantly changing.

Discharge measurements are made during high water by means of a cable, car, tagged wire and stay wire, and at low stages by wading. The initial point for soundings is the face of a cedar post on the left bank.

During 1913, the gauge was read by J. E. Capstick.

DISCHARGE MEASUREMENTS of Milk River at Pendant d'Oreille, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 25	J. E. Degnan.	176	295 0	2 05	3 88	606.
May 1	do	154	249.0	1 89	3 73	470.
May 14	do	154	226.0	1 97	3 63	447.
May 17	do	173	265.0	1 94	3 75	513.
May 29	do	173	271.0	1.81	3.83	491.
June 4	do	172	224.0	1 77	3.61	397.
June 17	do	172	147.0	1.44	3.14	211.
June 19	do	169	139.0	1.34	3.04	186.
July 7	do	120	121.0	1.64	3.08	198.
July 9	do	120	115.0	1.33	3.00	153.
July 23	do	171	76.6	1.10	2.72	84.
July 26	do	41	45.2	1.52	2.65	69.
Aug. 9	do	50	51.5	1.22	2.63	63.
Aug. 16	do	53	71.0	1.38	2.755	98.
Sept. 2	do	35	32.4	1.24	2.43	40.
Sept. 5	do	35	29.8	1.04	2.35	31.
Sept. 16	do	35	26.1	1 04	2.28	27.
Sept. 19	do	35	29.0	1.01	2.32	29.
Oct. 4	do	36	33.9	1 14	2.38	39.
Oct. 6	do	37	39.6	1 31	2.50	52.
Oct. 10	do	179	77.5	1 11	2.70	86.
Oct. 22	do	39	52.8	1.62	2 70	86.
Oct. 28	do	40	50.2	1 23	2 65	62.
Nov. 6	do	40	52.1	1.02	2.63	53.
Nov. 8	do	61	67 1	1.19	2 83	80.

Daily Gauge Height and Discharge of Milk River at Pendant d'Oreille, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	a 40.	3.71	482.	3.85	566.
2	.....	65.	3.50	368.	3.80	533.
3	.....	85.	3.43	332.	3.75	503.
4	.....	140.	3.41	323.	3.65	447.
5	.....	300.	3.42	328.	3.62	431.
6	4.34	560.	3.61	425.	3.50	368.
7	4.12	325.	3.35	296.	3.45	342.
8	4.10	543.	3.35	296.	3.35	296.
9	4.10	a 744.	3.29	270.	3.33	287.
10	4.42	981.	3.44	337.	3.16	218.
11	4.46	1,011.	3.43	332.	3.15	214.
12	4.64	1,147.	3.34	292.	3.41	323.
13	5.22	1,588.	3.41	323.	3.40	318.
14	5.10	1,497.	3.70	475.	3.35	296.
15	5.04	1,451.	3.81	540.	3.10	196.
16	4.86	1,315.	3.87	580.	3.08	189.
17	4.53	1,064.	3.75	503.	3.03	172.
18	4.30	892.	3.68	464.	2.98	156.
19	4.38	951.	4.01	677.	3.04	176.
20	4.32	907.	3.95	634.	3.11	200.
21	4.51	1,049.	4.35	929.	3.15	214.
22	4.42	981.	4.12	759.	3.14	210.
23	4.28	877.	3.94	627.	3.11	200.
24	4.11	751.	3.85	566.	3.25	252.
25	3.84	559.	3.90	600.	3.12	203.
26	3.62	431.	3.99	663.	3.08	189.
27	3.46	347.	3.79	527.	3.26	256.
28	3.51	373.	3.84	559.	3.31	278.
29	3.60	420.	3.88	586.	3.65	447.
30	3.90	600.	3.92	614.	4.02	685.
31	.....	.....	3.87	580.	.....	.....

a April 1st to April 9th ice breaking up: discharge estimated.

Daily Gauge Height and Discharge of Milk River near Pendant d'Oreille, for 1913.

Day.	July		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.85	566	2.71	82	2.42	37	2.45	40
2	3.73	492	2.64	68	2.40	35	2.40	35
3	3.65	447	2.62	65	2.38	33	2.35	31
4	3.35	296	2.60	61	2.35	31	2.38	33
5	3.25	252	2.65	70	2.35	31	2.45	40
6	3.12	203	2.59	59	2.32	29	2.50	46
7	3.01	165	2.53	50	2.33	30	2.51	47
8	3.02	169	2.62	65	2.33	30	2.55	53
9	2.70	80	2.65	70	2.33	30	2.60	61
10	2.89	128	2.61	63	2.25	25	2.66	72
11	o2.86	119	2.57	56	2.29	27	2.59	59
12	o2.83	111	2.67	74	2.29	27	2.59	59
13	o2.80	103	2.95	146	2.25	25	2.57	56
14	2.78	198	3.02	169	2.25	25	2.55	53
15	2.76	93	2.86	119	2.27	26	2.62	63
16	2.65	70	2.75	91	2.25	25	.81	106
17	2.75	91	2.66	72	2.25	25	2.95	146
18	2.72	84	3.98	656	o2.28	27	o2.91	134
19	2.70	80	3.11	200	2.30	28	2.88	125
20	2.69	78	2.85	116	2.31	29	2.76	93
21	2.65	70	2.76	93	2.31	29	2.73	87
22	2.69	78	2.70	80	2.36	32	2.70	80
23	2.70	80	2.65	70	2.35	31	2.68	76
24	2.66	72	2.60	61	2.41	36	2.65	70
25	2.60	61	2.55	53	2.44	39	2.64	68
26	2.65	70	2.52	49	2.41	36	2.65	70
27	2.63	66	2.46	41	2.42	37	2.68	76
28	2.60	61	2.42	37	2.51	47	2.69	78
29	2.60	61	2.41	36	2.50	46	2.70	80
30	2.65	70	2.39	34	2.48	44	2.71	82
31	2.79	101	2.45	40	.....	.....	2.73	87

o Gauge heights interpolated.

Monthly Discharge of Milk River at Pendant d'Oreille, for 1913.

(Drainage area 2,175 sqaure miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (6-30)	1,588	347	894.0	0.411	0.38	44,352
May	929	270	493.0	0.227	0.26	30,313
June	685	156	306.0	0.141	0.16	18,208
July	566	61	146.0	0.067	0.08	8,977
August	656	34	95.0	0.044	0.05	5,841
September	47	25	31.7	0.015	0.02	1,886
October	146	31	71.2	0.033	0.04	4,378
The period	.....	.....	.....	.....	0.99	113,955

MILK RIVER AT SPENCER'S LOWER RANCHE.

This station was established August 7, 1909, by F. H. Peters. In August, 1913, it was re-established as an international station. It is located south of the international boundary, on the N.E. ¼ Sec. 6, Tp. 37 N, Rge. 9, E. of Montana Principal Meridian, and is south of the S.E. ¼ Sec. 3, Tp. 1, Rge. 5, W. 4th Mer., in Canada. It is 90 miles by trail from Milk River station, 26 miles from Pendant d'Oreille police detachment and one half mile from Brownlee's ranche house in Montana.

The original staff gauge is located 1000 feet upstream from the international boundary. On August 13, 1913, an automatic gauge was established 300 feet south of the boundary. The gauge is a Gurley weight-driven automatic water stage register and is enclosed in a wooden shelter five feet square. A staff gauge is also placed outside the gauge house. The zero of the gauge (elev. 82.94) is referred to a permanent iron bench mark (assumed elev. 100.00), situated at the old gauge 1300 feet upstream on the left bank.

The channel is straight for 500 feet above and 600 feet below the station. The right bank is high and clean; the left is high and very heavily wooded. Neither is liable to overflow. The bed of the stream is composed of gravel and rock near the left bank and of quicksand and rock from the middle to the right bank,

Discharge measurements at ordinary stages are made by wading at the gauge. The initial point for soundings is a spike driven in a 4″ x 6″ timber in the left bank in line with the downstream side of the gauge house. At high stages, measurements are made by means of a cable and car 1800 feet upstream.

During 1913, the old gauge was read by A. W. Brownlee from April 1st to September 30th. During the remainder of the year the staff gauge at the automatic gauge was read by Frank Gallaway.

DISCHARGE MEASUREMENTS of Milk River at Spencer's Lower Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 26	J. E. Degnan	121	212	2.69	a 3.58	572.0
April 28	do	114	200	2.01	3.26	403.0
May 16	do	108	193	2.63	3.45	508.0
May 18	J. B. Stewart (U.S.G.S.)	116	216	2.18	3.45	470.0
May 30	J. E. Degnan	126	251	2.06	3.70	518.0
June 18	do	109	120	1.70	2.71	205.0
July 8	do	57	71	2.33	2.72	165.0
July 22	J. B. Srewart (U.S.G.S.)	62	56	1.45	2.23	81.0
July 25	J. E. Degnan	51	50	1.63	b 2.16	84.0
Aug. 13	do	49	43	1.39	c 2.98	60.0
Aug. 13	J. B. Stewart (U.S.G.S.)	53	40	1.48	2.95	59.0
Sept. 4	J. E. Degnan	44	27	1.25	2.56	34.0
Sept. 18	do	29	20	1.12	2.42	22.0
Oct. 8	do	49	42	1.31	2.80	55.0
Oct. 24	do	49	48	1.53	3.05	74.0
Nov. 7	do	49	46	1.19	2.97	55.0
Nov. 9	W. A. Lamb (U.S.G.S.)	50	56	1.52	3.14	85 0
Dec. 24	do	42	18	0.81	2.95	14.7

a–b Gauge heights from rod below cable station zero elev. 85-32.
c–d Gauge heights from rod at automatic guage, zero elev. 82-84.

DAILY GAUGE HEIGHT AND DISCHARGE of Milk River at Spencer's Lower Ranche, for 1913.

DAY.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec. ft.*
1	*a*5.50	60*c*	3.63	642	3.67	676	3.74	739
2	5.55	105	3.51	550	3.70	702	3.63	642
3	4.23	130	3.41	484	3.65	658	3.55	580
4	5.80	330	3.25	398	3.60	618	3.16	353
5	5.60	480	3.32	434	3.38	467	2.99	277
6	4.27	550	3.28	414	3.24	393	2.86	229
7	4.55	680	3.27	408	3.19	368	2.75	192
8	4.61	720	3.29	419	3.14	343	2.72	184
9	4.45	1,078	3.23	388	3.10	325	2.68	175
10	4.18	1,259*d*	3.18	363	3.07	311	2.65	168
11	4.20	1,287	3.22	383	3.05	302	2.62	161
12	4.42	1,634	3.26	403	2.95	261	2.56	148
13	4.50	1,771	3.29	419	3.00	281	2.48	131
14	4.55	1,858	3.20	373	2.89	239	2.45	125
15	4.52	1,806	3.32	434	2.87	232	2.45	121
16	4.48	1,737	3.42	490	2.86	229	2.42	119
17	4.41	1,617	3.46	516	2.75	192	2.34	104
18	4.18	1,259	3.45	509	2.72	184	2.33	102
19	4.25	1,362	3.46	516	2.70	179	2.31	99
20	4.10	1,149	3.66	667	2.90	243	2.32	101
21	4.04	1,070	3.52	557	2.87	232	2.30	97
22	4.10	1,149	3.93	937	2.83	218	2.15	74
23	4.05	1,082	3.74	739	2.79	205	2.17	77
24	3.97	984	3.65	658	2.84	222	2.17	77
25	3.75	748	3.58	603	2.88	236	2.16	75
26	3.58	603	3.60	618	2.76	195	2.16	75
27	3.37	461	3.57	595	2.83	218	2.14	73
28	3.29	419	3.56	587	3.23	388	2.14	73
29	3.32	434	3.56	587	2.94	257	2.12	70
30	3.45	509	3.67	676	2.89	239	2.12	70
31	.....	.....	3.65	658	.....	.....	2.11*b*	69

a to b Gauge heights from staff gauge at upper section.
c to d Discharges are estimated due to ice conditions prevailing.

Daily Gauge Height and Discharge of Milk River at Spencer's Lower Ranche, for 1913.

Day.	August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	*a*2.12	70	2.75	50	2.76	51	3.02	65	3.22	.....
2	2.11	69	2.72	47	2.74	49	3.09	70	3.24	.....
3	2.11	69	2.60	36	2.71	46	3.03	64	3.30	.....
4	2.10	68	2.55	32	2.70	46	3.03	63	3.30	.....
5	2.12	70	2.53	31	2.77	52	3.08	66	3.30	.....
6	2.13	72	2.50	28	2.86	60	3.08	65	3.30	.....
7	2.13	72	2.48	27	2.87	61	*d*3.06	63	3.30	.....
8	2.13	72	2.47	26	2.82	56	3.07	71	3.30	.....
9	2.14	73	2.46	25	2.83	58	3.14	85	3.30	.....
10	2.14	73	2.46	25	2.89	62	3.18	89	3.28	.....
11	2.08	66	2.46	25	2.88	61	3.10	82	3.28	.....
12	2.08	66	2.44	24	2.86	59	3.08	80	3.28	.....
13	*b*2.98	61	2.43	23	2.88	61	3.00	72	3.28	.....
14	*c*3.40	99	2.43	23	2.88	61	2.85	59	3.28	.....
15	3.56	115	2.43	23	2.90	62	3.25	95	3.28	.....
16	3.35	96	2.42	22	2.89	61	3.15	86	3.28	.....
17	3.18	82	2.43	23	2.97	68	3.40	108	3.38	.....
18	4.58	207	2.43	23	3.30	98	3.26	96	3.38	.....
19	4.41	193	2.45	24	3.30	97	3.24	94	3.38	.....
20	4.01	158	2.45	24	3.22	90	3.18	89	3.37	.....
21	3.63	125	2.48	27	3.15	84	2.98	71	3.00	.....
22	3.29	95	2.54	31	3.08	77	3.44	112	2.45	.....
23	3.12	80	2.62	38	3.05	74	3.10	82	2.09	.....
24	3.04	74	2.58	35	3.05	74	3.11	83	.....	.....
25	2.98	69	2.58	35	3.03	71	3.12	84	*e*2.00	.....
26	2.93	66	2.63	39	3.02	70	3.13	85	.....	.....
27	2.89	62	2.66	42	3.00	67	3.14	86	.....	.....
28	2.86	60	2.65	41	3.02	67	3.15	86	.....	.....
29	2.82	56	2.70	46	3.01	66	3.16	87	.....	.....
30	2.80	54	2.76	51	3.04	67	3.18	89	.....	.....
31	2.77	52	.....	.....	2.92	56	.....	.....	.....	.....

a to b Gauge heights from daily readings on staff at upper section.
c to d Gauge heights from automatic gauge record.
d to e Gauge heights from daily readings on staff at automatic gauge.
f Ice conditions after Nov. 30; not sufficient data to compute discharge.

Monthly Discharge of Milk River at Spencer's Lower Ranche, for 1913.

(Drainage area 2,448 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	1,858	60	944	0.386	0.431	56,172
May	937	363	530	0.217	0.250	32,588
June	702	179	320	0.131	0.146	19,041
July	739	69	180	0.074	0.085	11,068
August	216	52	85	0.035	0.040	5,214
September	51	22	32	0.013	0.014	1,874
October	98	46	66	0.027	0.031	4,027
November	112	59	81	0.033	0.037	4,814
The period	.....	.....	.....	.....	1.034	134,798

STUDY OF CONDITIONS OF RUN-OFF in watershed of Milk River from its headwaters to its eastern crossing from Canada.
Sec. 3, Tp. 1, Rge 5, W. of 4 Mer.

STATION.	AREA OF WATERSHED IN SQUARE MILES.						RUN-OFF IN AC. FT.		RUN-OFF PER SQ. MILE IN AC. FT.	
	Additional to last Station.			Total for Station			Additional to last Station.	Total for Station.	For additional Area.	For total Area.
	Canada.	U.S.A.	Total.	Canada.	U.S.A.	Total.				
Peters' Ranche (N. Br.)....11-1 23-4.....	.....	.....	.....	18	91	109	.....	4,771	.....	43.77
Mackies' Ranche (S. Br.)....31 1 18-4.....	.....	.....	.....	51	390	441	.....	8,517	.....	19.31
Milk River.....28 2 16 4.....	519	8	527	588	489	1,077	— 984	12,304	0.00	11.42
Writing-onStone.....35-1-13-4.....	414	129	543	1,002	618	1,620	— 28	12,276	0.00	7.58
Pendant d'Oreille.....16 2 8 4.....	397	158	555	1,399	776	2,175	— 171	12,105	0.00	5.57
Spencer's Lower Ranche..... 3-1- 5-4.....	246	27	273	1,645	803	2,448	— 990	11,115	0.00	4.53

DEER CREEK AT DICKENSON'S RANCHE.

This station was established May 26, 1911, by J. E. Degnan. It is 22 miles by trail from Coutts and is located on the S.W. ¼ Sec. 15, Tp. 1, Rge. 12, W. 4th Mer.,about 300 feet above the dam and intake of Dickenson Bros' irrigation ditch and about one quarter of a mile above their ranche buildings.

The gauge, which is a plain staff graduated to feet and hundredths, is located at the right bank. The zero (elev. 92.72) is referred to the top of a post at the final point for soundings on the right bank (assumed elev. 100.00).

The stream flows in one channel and is straight for about 30 feet above and 100 feet below the station. The right bank is composed of a sandy loam, covered with rose bushes, and is liable to overflow. The left bank is high and liable to overflow. The bed of the stream is composed of gravel and sand and is about 40 feet wide. In ordinary stages the stream averages from six feet to ten feet wide and runs along the right side of the bed. It is liable to great change in high water but apparently remains constant in low water.

Discharge measurements are made by wading. The initial point for soundings is the face of a stake driven in the left bank and marked "I.P."

No gauge height observations were obtained during 1913 as it was impossible to secure an observer.

DEER CREEK CATTLE COMPANY IRRIGATION DITCH.

This station was established on April 27, 1912, by J. E. Degnan. It is located on the S.W. ¼ Sec. 36, Tp. 1, Rge. 12, W. 4th Mer. It is 200 feet below the dam and intake of the ditch.

The gauge, which is a plain staff graduated to feet and hundredths, is located at the left bank. The zero (elev. 93.49) is referred to a permanent bench mark (assumed elev. 100.00), located on a stone on the northwest corner of the barn foundation, about 100 feet east of the gauge.

The original bed of the stream is composed of clay, but a great amount of sand has washed in from the creek, causing a continual change in the cross-section. The banks are not liable to overflow, the surplus water finding its way through the two spillways at the dam.

Discharge measurements are made by wading. The initial point for sounding is a spike driven in the downstream brace post of the gauge.

During 1913, the gauge was read by F. W. Webster from March 29th until it went dry on July 14th. As no discharge measurements were obtained during the season no estimate of the discharge has been made.

Study of Conditions of Flow of Deer Creek, in 1913.

Date.	Hydrographer.	Location.	Discharge.
			Sec.-ft.
June 13-14	J. E. Degnan	S.W. 36-1-12-4	0.43
" "	do	S.E. 35- "	0.77
" "	do	N.E. 26- "	0.61
" "	do	S.W 26- "	0.55
" "	do	N.E. 22- "	0.76
" "	do	S.W 22- "	0.88
" "	do	N.W. 15- "	0.95
" "	do	S.W. 15- "	0.92
July 3	do	S.W. 36-1-12-4	1.40
"	do	S.E. 35- "	1.50
"	do	N.E. 26- "	1.46
"	do	S.W. 26- "	1.51
July 7	do	N.E. 22-1-12-4	1.20
"	do	S.W. 22- "	1.24
"	do	N.W. 15- "	1.42
"	do	S.W. 15- "	1.47
July 11	J. E. Degnan	S.W. 36-1-12-4	0.52
"	do	S.E. 35- "	0.98
"	do	N.E. 26- "	1.00
"	do	S.W. 26- "	1.31
"	do	N.E. 22- "	0.88
"	do	N.W. 15- "	1.08
"	do	S.W. 15- "	0.86
Aug. 29	do	S.W. 36- "	0.032
"	do	N.E. 26- "	0.099
"	do	S.W. 26- "	0.309
"	do	S.W. 22- "	0.348
"	do	N.W. 15- "	0.443
"	do	S.W. 15- "	0.499
Oct. 2	do	S.W. 36-1-12-4	Nil.
"	do	N.W. 26- "	Nil.
"	do	S.W. 26- "	0.049
"	do	S.W. 22- "	0.068
"	do	S.W. 15- "	0.192
Oct. 21	J. E. Degnan	S.W. 36-1-12-4	0.420
"	do	S.W. 15-1-12-4	0.698

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Milk River drainage basin, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of of Section.	Mean Veliocty.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
May 2	J. E. Degnan	Bear Gulch Creek.	Sec. 19-2-9-4	8.5	6.10	1.72	10.50
June 4	do	do	do	3.5	3.65	0.55	2.03
July 22	do	do	do				Dry
July 28	do	do	do				Dry.
Sept. 1	do	do	do				Dry.
Sept. 16	do	do	do				Dry.
Oct. 3	do	do	do				Dry.
Oct. 22	do	do	do				Dry.
Oct. 28	do	do	do				Dry.
May 2	do	Deadhorse Creek	Sec. 4-2-11-4	5.4	3.31	1.18	3.91
July 22	do	do	do				Dry.
July 28	do	do	do				Dry.
Sept. 1	do	do	do				Dry.
Sept. 16	do	do	Sec. 3-2-11-4				Dry.
Oct. 3	do	do	do				Dry.
Oct. 22	do	do	do				Dry.
Nov. 8	do	do	do				Dry.
May 12	do	Deer Creek	Sec. 15-1-12-4	5.6	4.31	1.72	7.43
May 27	do	do	do	6.8	4.31	1.18	5.07
June 5	do	do	do	6.0	2.90	0.77	2.23
June 13	do	do	do	4.9	1.93	0.53	1.03
May 2	do	Halfbreed Creek	Sec. 28-2-10-4	9.2	12.80	1.27	16.25
May 14	do	do	do	9.5	16.30	1.70	27.80
May 28	do	do	do	9.0	11.60	1.14	13.30
June 4	do	do	do	8.6	9.12	0.63	5.75
June 16	do	do	do	4.9	1.19	0.28	0.33
July 5	do	do	do	8.6	9.29	0.67	6.00
July 22	do	do	do				Nil *b*
July 28	do	do	do				Nil *b*
Sept. 1	do	do	do				Dry.
Sept. 16	do	do	do				Dry.
Oct. 2	do	do	do				Dry.
Oct. 3	do	do	do				Dry.
Oct. 22	do	do	do				Dry.
Oct. 28	do	do	do			*a*	0.17
Nov. 8	do	do	do			*a*	0.47
May 16	do	Kennedy Creek	Sec. 3-1-5-4	9.0	2.90	1.21	3.52
Oct. 8	do	do	do			*a*	0.47
July 19	do	Mackie Creek	Sec. 19-2-18-4	9.0	3.80	1.08	4.12
Sept. 12	do	do	do	6.3	3.12	0.62	1.92
Sept. 27	do	do	do	6.0	2.40	0.38	0.91
Nov. 1	do	do	do	5.1	1.85	0.94	1.74
May 2	do	Miners Creek	Sec. 11-2-11-4	10.0	6.00	1.80	10.80
May 14	do	do	Sec. 11-1-11-4	13.0	8.60	1.66	14.30
July 5	do	do	Sec. 10-2-11-4	4.8	1.18	0.78	0.92
July 22	do	do	do				Dry.
July 28	do	do	do				Nil *b*
Sept. 1	do	do	Sec. 11-2-11-4				Dry.
Sept. 16	do	do	Sec. 10-2-11-4				Dry.
Oct. 3	do	do	do				Nil *b*
Oct. 11	do	do	do			*a*	0.08
Oct. 22	do	do	do			*a*	0.04
Oct. 28	do	do	do			*a*	0.05
Nov. 5	do	do	do			*a*	0.11
Nov. 8	do	do	do			*a*	0.64
July 1	do	Police Creek	Sec. 35-1-13-4	6.5	2.95	0.58	1.71
July 21	do	do	do				Dry.
July 30	do	do	do				Dry.
Sept. 15	do	do	do				Dry.
April 11	do	Red Creek	Sec. 18-1-15-4	24.5	30.40	1.41	42.80

a Weir measurement.
b Water standing in pools.

PAKOWKI LAKE DRAINAGE BASIN.

General Description.

The drainage into Pakowki Lake comes from three different directions; from the west by way of Etzikom Coulee, from the southeast through canal and Ketchum creeks, and from the northeast through Manyberries Creek. The lake has no outlet. The streams within this drainage basin are very similar in their general characteristics, all having narrow, deep and well defined valleys, with sparse growths of brush along the bottoms, and all drainage a sandy and very unproductive appearing soil. The drainage consists almost entirely of the spring run-off, the soil being so devoid of moisture as to take care of any ordinary rainfall without allowing any drainage into the streams, except during periods of exceptional rainfall.

Very little information has as yet been collected regarding the flow in any of the above mentioned streams, the only one touched upon as yet being Manyberries Creek. No high water measurements have been taken, and owing to the nature of the channel it is practically impossible to estimate the spring run-off.

Hooper and Huckvale have constructed very efficient irrigation works, and divert water from Manyberries Creek to irrigate 2,120 acres of hay meadow. The yield of hay has been very much increased by the use of the water.

MANYBERRIES CREEK AT HOOPER AND HUCKVALE'S RANCHE.

This station was established June 7, 1910, by H. R. Carscallen on the S.E. ¼ Sec. 3, Tp. 5, Rge. 6, W. 4th Mer. It was moved May 2, 1912, by J. E. Degnan to the S.W. ¼ Sec. 27, Tp. 4, Rge. 6, W. 4th Mer. It is located about three hundred yards south of Messrs. Hooper and Huckvale's ranche buildings and one half mile downstream from the dam and intake of their irrigation ditch.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a post driven in the bed of the stream and securely stayed to the right bank. The zero of the gauge (elev. 87.00) is referred to a permanent iron bench mark (assumed elev. 100.00), sunk in the right bank about fifty feet north of the gauge.

The channel is straight for about one hundred feet upstream and two hundred feet downstream from the station. The left bank is high and will not overflow. The right bank is low, covered with brush, and is liable to overflow in extreme high water. The bed of the stream is composed of sand and gravel, and shifts at high stages.

Discharge measurements are made by wading. The initial point for soundings is a post driven in the right bank.

During 1913, the gauge was read by Sidney Hooper.

DISCHARGE MEASUREMENTS of Manyberries Creek at Hooper and Huckvale's Ranche, in 1913.

Date	Hydrographer.	Width.	Area of Section	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 29	J. E. Degnan				1.85	a 0.15
July 23	do				Dry	Nil.
Oct. 25	do				Dry.	Nil.

a Discharge estimated.

Daily Gauge Heights and Discharge of Manyberries Creek at Hooper and Huckvale's Ranche, for 1913.

Day.	March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec. ft.*	*Feet.*	*Sec. ft.*	*Feet.*	*Sec. ft.*	*Feet.*	*Sec. ft.*
1	.....	.....	*b*4.73	76.00	1.86	0.12	1.60	0.00
2	.....	.....	4.60	63.00	1.02	.00	*b*1.59	.00
3	.....	.....	4.54	61.00	1.11	.00	*b*1.58	.00
4	.....	.....	4.96	75.00	1.13	.00	1.58	.00
5	.....	.....	3.19	16.10	1.85	.10	1.58	.00
6	.....	.....	4.38	55.00	1.85	.10	1.57	.00
7	2.75	7.20	3.66	31.00	1.85	.10	1.57	.00
8	2.96	10.80	3.64	30.00	1.83	.06	1.57	.00
9	*b*3.17	15.60	4.87	72.00	1.81	.02	1.57	.00
10	4.85	71.00	4.84	71.00	1.80	.00	1.57	.00
11	3.88	38.00	4.74	68.00	1.77	.00	1.58	.00
12	2.92	10.10	4.79	69.00	1.78	.00	1.59	.00
13	2.82	8.30	4.75	68.00	1.82	0.04	1.59	.00
14	2.88	9.30	4.31	53.00	.....*a*	76.00	1.60	.00
15	2.52	4.30	3.05	12.70	3.28	18.70	1.60	.00
16	2.20	1.50	2.78	7.70	2.09	0.86	1.60	0.00
17	2.12	1.02	2.96	10.80	2.00	.50	.....	Nil.
18	1.80	0.00	2.60	5.20	1.96	.34	.....	"
19	1.63	0.00	2.05	0.70	1.90	.20	.....	"
20	.....	Nil.	1.97	.38	1.85	.10	.....	"
21	.....	"	1.93	.26	1.85	.10	.....	"
22	.....	"	1.86	.12	1.85	.10	.....	"
23	.....	"	1.86	.12	1.84	.08	2.04	0.66
24	.....	"	*b*1.86	.12	1.83	.06	1.95	.30
25	.....	"	*b*1.86	.12	1.72	.00	1.76	0.00
26	.....	"	*b*1.85	.10	1.65	.00	3.58	28.00
27	.....	"	*b*1.85	.10	1.64	.00	2.38	2.90
28	.....	"	*b*1.85	.10	1.62	.00	2.68	6.20
29	3.60	29.00	1.85	.10	1.60	.00	2.44	3.50
30	4.86	72.00	1.85	0.10	1.61	.00	1.85	0.10
31	4.80	70.00	.....	.....	1.60	0.00	.....	.....

Below gauge heights 1.80 water standing in pools.
a Gauge submerged; discharge estimated.
b Gauge heights interpolated.

Monthly Discharge of Manyberries Creek at Hooper and Huckvale's Ranche, for 1913.

(Drainage area 139 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area	Total in Acre-feet
March (7-31)	72.00	0.00	13.90	0.100	0.09	690
April	75.00	0.10	27.90	0.200	0.22	1,660
May	76.00	0.00	3.15	0.023	0.03	194
June	28.00	0.00	1.39	0.010	0.01	83
The period	.....	.....	.....	.....	0.35	2,627

HOOPER AND HUCKVALE IRRIGATION DITCH.

This station was established May 2, 1912, by J. E. Degnan. It is located on the S.W. ¼ Sec. 27, Tp. 4, Rge. 6, W. 4th Mer., about 100 yards north of Messrs. Hooper and Huckvale's ranche buildings and 700 feet downstream from the dam and intake of the ditch.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a post driven in the bed of the stream and securely stayed to the right bank. The zero of the gauge (elev. 93.35) is referred to a permanent bench mark (assumed elev. 100.00), on the northwest corner of the foundation of the ranche house.

The channel is straight for about 50 feet above and 30 feet below the station. The bed of the stream is composed of clay and is not liable to shift.

Discharge measurements are made with a current meter by wading. The initial point for soundings is a post driven in the right bank.

During 1913, the gauge was read by Sidney Hooper from March 7th until May 31st. As no discharge measurements were obtained during the season no estimate of the discharge has been made.

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Pakowki Lake drainage basin, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
July 23..	J. E. Degnan....	Canal Creek.....	Sec. 6-4-6-4	4.2	4.15	0.83	3.44
" 25....	do	do	do				Dry.
Oct. 25....	do	do	do				Dry.
July 23....	do	Ketchum Creek....	Sec. 16-4-6-4				Dry.
Oct. 25....	do	do ...	do				Dry.

SAGE CREEK DRAINAGE BASIN.

General Description.

Sage creek is a small unimportant stream which rises in township 5, range 4, west of the 4th meridian, and flows southerly, crossing the international boundary in range 2.

The stream has no definite or permanent source of supply, and derives its discharge principally from the melting of snow, which accumulates in numerous coulees during the winter months. The period of flow therefore is in general confined to the spring months while the melting snow is passing off. Very heavy rains sometimes cause a flow, but the drainage area being absolutely devoid of tree growth the run-off is very rapid.

After entering the United States, Sage Creek spreads out over a large dry lake which has no outlet. This lake is about ten miles long and averages one and a half miles in width, and lies close to the boundary. The lake is bounded on the south by a low range of hills and at some time has held two or three feet of water at its deepest parts. Since 1908 there has been no water in the lake.

SAGE CREEK AT WILD HORSE POLICE DETACHMENT.

This station was established on August 10, 1909, by F. H. Peters. It is located on the N.E. ¼ Sec. 9, Tp. 1, Rge. 2, W. 4th Mer., about one and a quarter miles from Wild Horse police post. It is about 115 miles by trail from Milk River P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post in the centre of the channel. The zero of the gauge (elev. 93.36) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank 1020 feet south and 600 feet east of ¼ mound north of Sec. 9.

The channel is straight for 40 feet above and below the station. The banks are composed of hard clay, and are high, but liable to overflow. The bed is composed of hard gumbo clay.

Discharge measurements are made with a meter by wading. The initial point for soundings is the face of a post on the right bank, marked "I.P." in red paint.

During 1913, the gauge was read by George Sherwood. As no discharge measurements were obtained during the season no estimate of the discharge has been made.

LODGE CREEK DRAINAGE BASIN.

General Description.

Lodge Creek, which rises in township 7, range 3, west of the fourth meridian, flows in a southerly direction for about 12 miles, then turns southeastward, crosses the international boundary in section 4, township 1, range 28, west of the third meridian, and eventually empties into Milk River Chinook, Montana. Its principal tributary is Middle Creek, which joins it in section 4, township 2, range 29, west of the third meridian.

Near its head the valley is very deep and narrow but it broadens out considerably lower down, giving rise to large flats and meadows. The upper part of the drainage basin is cut up to a great extend by deep coulees which drain into the creek. This part of the creek is thickly covered with brush along the banks, but lower down it is totally devoid of tree growth. The valley is rather unproductive owing to the absence of moisture but a few good hay meadows have been developed along its course through the storage of the flood waters and their application to the soil by irrigation. As is the case with many of the streams in this locality the flow in Lodge Creek, is not continuous throughout the year, the creek being dry, with the exception of pools of standing water, during the greater part of the summer months, At flood stages the creek carries a considerable amount of water and as a result its channel is wide and well defined throughout the whole length of its course.

Three stations have been established on the main stream, at Willow Creek Police detachment near the international boundary, at Hartt's ranche near the head of the creek and about midway between these last two at Hester's ranche near the fourth meridian. Descriptions of these stations are given below.

EAST BRANCH OF LODGE CREEK AT ENGLISH'S RANCHE.

This station was established on October 7, 1911, by M. H. French. It is located at James English's ranche in the S.E. ¼ Sec. 1, Tp. 7, Rge. 3, W. 4th Mer., about 150 feet north of his house. It is five miles above the junction with the main creek and about 45 miles by trail from Medicine Hat.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream near the right bank. The zero of the gauge (elev. 95.35) is referred to a permanent iron bench mark (assumed elev.100.00), located on the left bank four feet from the initial point for soundings and in line with the regular cross section.

The channel is straight for about 50 feet above and 25 feet below the station. Both banks are wooded and high enough to contain the stream during all stages. The bed is composed of very coarse gravel and will not shift.

Discharge measurements are made with a meter by wading, a short distance above the gauge. The initial point for soundings is a four inch stake, one foot above ground, on the left bank.

During 1913, the gauge was read by Mrs. Annie English.

Water is diverted from this stream at a point about three miles above this station, by James English. During the irrigation season almost the total flow is diverted.

DISCHARGE MEASUREMENTS of E. Br. Lodge Creek at English's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 10	H. D. St. A. Smith	14.0	5.51	1.15	1.35	6.44
June 12	do	.....	.....	.....	0.88	a 0.24
July 9	do	.....	.....	.....	0.82	a 0.17
July 31	do	.....	.....	.....	.....	Nil. b
Sept. 1	do	.....	.....	.....	.....	do b
Sept. 24	do	.....	.....	.....	.....	do b
Oct. 15	do	.....	.....	.....	.....	do b
Nov. 10	do	.....	.....	.....	.....	do b

a Weir Measurement.
b Creek dry.

DAILY GAUGE HEIGHT AND DISCHARGE of E. Br. Lodge Creek at English's Ranche, for 1913.

DAY.	April.		May.		June.		July.	
	Gauge Height.	Dis charge.	Gauge Height.	Dis charge.	Gauge Height.	Dis charge.	Gauge Height.	Dis-charge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.90	*c*0.00	1.24	4.10	0.77	0.11	1.22	3.70
2	4.00	*b*2.00	1.26	4.40	0.72	0.07	1.22	3.70
3	4.10	4.00	1.28	4.70	0.72	0.07	1.17	3.00
4	4.20	5.00	1.28	4.80	0.72	0.07	1.07	1.69
5	4.48	6.00	1.30	5.30	0.72	0.07	0.97	0.78
6	4.23	7.00	1.30	5.30	0.72	0.07	0.82	0.16
7	4.54	10.00	1.30	5.30	0.72	0.07	0.82	0.16
8	4.54	12.00	1.30	5.30	0.72	0.07	0.82	0.16
9	4.55	13.00	1.26	4.40	0.75	0.09	0.82	0.16
10	4.54	18.00	1.35	6.40	0.75	0.09	0.82	0.16
11	4.58	29.00	1.38	7.10	0.77	0.11	0.82	0.16
12	4.61	30.00	1.40	7.60	0.79	0.12	0.82	0.16
13	3.50	42.00	1.40	7.60	0.81	0.14	0.82	0.16
14	3.48	72.00	1.45	9.10	0.83	0.17	0.82	0.16
15	3.42	100.00*b*	1.58	14.00	0.82	0.16	0.82	0.16
16	3.30	114.00	1.50	10.90	0.82	0.16	0.82	0.16
17	2.95	93.00	1.48	10.17	0.78	0.11	0.82	0.16
18	2.72	79.00	1.40	7.60	0.78	0.11	0.82	0.16
19	2.55	69.00	1.40	7.60	0.78	0.11	0.82	0.16
20	2.35	57.00	1.35	6.40	0.76	0.10	0.82	0.16
21	2.15	45.00	1.20	3.40	0.74	0.08	0.82	0.16
22	2.05	39.00	1.21	3.60	0.72	0.07	0.82	0.16
23	1.82	25.00	1.11	2.20	0.72	0.07	0.77	0.11
24	1.71	19.70	1.09	1.92	0.72	0.07	0.77	0.11
25	1.62	15.60	1.06	1.58	0.87	0.26	0.77	0.11
26	1.42	8.20	1.01	1.09	1.02	1.19	0.77	0.11
27	1.32	5.80	0.96	0.70	1.12	2.33	Dry.	*a* Nil.
28	1.30	5.30	0.94	0.58	1.17	3.00	"	"
29	1.30	5.30	0.91	0.41	1.17	3.00	"	"
30	1.25	4.20	0.86	0.23	1.17	3.00	"	"
31	.....	.....	0.81	0.14	.....	.....	"	"

a Creek dry from July 27 to end of year.
b Discharge estimated on account of ice from April 2 to April 15.
c No water running.

MONTHLY DISCHARGE of East Branch Lodge Creek at English's Ranche, for 1913.

(Drainage area 15 square miles).

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	114.00	0.00	31.200	2.080	2.32	1,856
May	14.00	0.14	4.970	0.330	0.38	306
June	3.00	0.07	0.603	0.040	0.04	36
July	3.70	0.00	0.517	0.034	0.04	32*a*
August						
September						
October						
The period					2.78	2,230

a Creek dry July 27 to end of year.

ANDERSON DITCH NEAR THELMA.

This station was established on September 23, 1911, by W. A. Fletcher. It is located on the S.W. ¼ Sec. 23, Tp. 6, Rge. 3, W. 4th Mer., about fifteen feet below the intake of the ditch, and about one quarter of a mile from Robert Anderson's house.

The gauge, which is a plain staff graduated to feet and inches, is fixed to a post at the left bank of the ditch. The zero of the gauge (elev. 98.64) is referred to the top of a stake (assumed elev. 100.00). about five feet southeast of the gauge.

The channel is straight for twenty feet above and thirty feet below the gauge. Both banks are low but are not liable to overflow. The bed is composed of clay and gravel and is not liable to shift.

Discharge measurements are made by wading near the gauge. The initial point for soundings is the inner face of the post used as a bench mark.

No water was diverted during 1913.

LODGE CREEK AT HARTT'S RANCHE.

This station was established July 22, 1909, by F. T. Fletcher. It was originally located just north of the road allowance between Secs. 10 and 15, Tp. 6, Rge. 3, W. 4th Mer., but was moved on June 22, 1912, by G. R. Elliott, about 800 feet downstream to the N.W. ¼ Sec. 10, Tp. 6, Rge. 3, W. 4th Mer., about one mile below the junction of the east branch. It is about 45 miles by trail south of Medicine Hat.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a support on the upstream side of the wooden bridge near Mr. Hartt's house. The zero of the gauge (elev. 83.33) is referred to a permanent iron bench mark, (assumed elev. 100.00), which is located at the permanent section on the left bank, five feet south of the initial point for soundings and in line with the section.

The channel is straight for about 200 feet above and 50 feet below the station. The banks are high, steep and not liable to overflow. Both are covered with a dense growth of willow brush. The bed of the stream is composed of soft clay and there is one channel at all stages. At periods of no flow, water stands at a depth of as much as two feet at the gauge.

Discharge measurements are made during high water with a meter at the gauge. At ordinary stages measurements are made with a meter by wading, 840 feet upstream. The initial point for soundings is the face of a four inch post marked "I.P." located on the left bank, 300 feet north and 215 feet west of the gauge.

During 1913, the gauge was read by Mrs. Ed. Hartt.

DISCHARGE MEASUREMENTS of Lodge Creek at Hartt's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 20	H. D. St. A. Smith	20.5	78.30	1.04	6.30	81.70
May 10	do	12.1	19.10	0.51	3.25	10.00
June 13	do	10.0	5.95	0.18	2.40	1.07
July 10	do					a
Aug. 1	do					a
Sept. 1	do					a
Sept. 21	do					a
Oct. 14	do					a
Nov. 7	do					a

a Creek dry at section. Water standing in pools.

Daily Gauge Heights and Discharge of Lodge Creek at Hartt's Ranche, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.40	32 0	3.15	8.70	2 40	1.07	2.37	0.90
2	3.45	13 3	3.35	11.60	2 37	0.90	2.37	0.90
3	3 20	9.3	3.35	11 60	2 36	0 84	2.42	1.20
4	3 80	19 6	3 22	9 60	2 35	0 78	2.42	1.20
5	4 45	33 0	3 20	9.30	2 35	0.78	2.40	1.07
6	8.32	145.0	3 05	7.40	2 34	0 73	2.37	0.90
7	8 95	165 0	3.25	10.00	2 30	0 52	2.37	0.90
8	9.60	186.0	3 30	10.80	2 30	0 52	2.27	0.39
9	10 26	204 0	3.18	9.10	2 29	0 48	2.22	0.19
10	9 90	195.0	3.40	12.40	2 24	0.26	2.15	Nil[a]
11	9.86	194.0	3 75	18.70	2 22	0.19		"
12	11. 0	236 0	3.58	15.50	2.20	0.12		"
13	9 50	182 0	3 95	22 00	2 40	1.07		"
14	8 92	164 0	4 95	44.00	2 40	1 07		"
15	7.88	132.0	4 93	44 00	2 25	0 30		"
16	7.80	109 0	4.90	43 00	2.22	0 19		"
17	6 10	76.0	3 63	16 40	2.19	0 10		"
18	6 18	78.0	3 55	15.00	2.14	Nil		"
19	6 28	81.0	3.21	9.50	2 11	"		"
20	6.65	93.0	3.15	8.70	2 04	"		"
21	5.15	49.0	3.10	8.00	2.09	"		"
22	5 00	46.0	2.90	5.60	2 17	0 05		"
23	4 95	44 0	2.65	3.00	2.32	0.62		"
24	3.55	15.0	2.75	4.00	2.38	0.95		"
25	3 45	13 3	2.65	3.00	2.48	1.62		"
26	3 43	13.0	2.60	2.60	2.32	0 62		"
27	3.50	14.2	2.58	2.40	2.63	2.90		"
28	3.95	22.0	2.55	2.20	2.77	4.20		"
29	3.65	17.0	2.50	1.76	2.67	3.20		"
30	3 45	13.3	2.47	1.54	2.52	1 92		"
31			2 43	1 27				"

a No flow, water standing in pools from July 10 to end of year.

Monthly Discharge of Lodge Creek at Hartt's Ranche, for 1913.

(Drainage area 78 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	236.00	9.30	87.10	1.120	1.25	5,183
May	44.00	1.27	12.00	0.154	0.18	738
June	4.20	0.00	0.87	0.011	0 01	52*a*
July	1.20	0.00	0.25	0.003	0.00	15*b*
August						.....*b*
September						*b*
October						*b*
The period					1.44	5,988

a Creek standing in pools June 18-21.
b Creek standing in pools July 10 to end of year.

LODGE CREEK AT HESTER'S RANCHE.

This station was established August 31, 1912, by G. R. Elliott. It is located on the N.E. ¼ Sec. 36, Tp. 3, Rge. 1, W. 4th Mer., and is about seventeen miles by trail west from Govenlock P. O., Sask.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a heavy post, sunk in the bed of the stream at the right bank, 305 feet S.33° E. of the quarter

mound of Sec. 36, Tp. 3, Rge. 1, W. 4th Mer. The zero of the gauge (elev. 87.51) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank immediately back of the initial point.

The channel is straight for 100 feet above and 30 feet below the station. The banks are high, brush covered, and are not liable to overflow. The bed is composed of clean gravel.

Discharge measurements are made at the gauge, at ordinary stages by wading and at low stages by a weir. The initial point for soundings is the face of a five inch post on the right bank marked "I.P" in knife cuts.

During 1913, the gauge was read by Miss Marcia Hester.

DISCHARGE MEASUREMENTS of Lodge Creek at Hester's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 22	H. D. St. A. Smith	24.0	33.60	2.42	2.45	81.50
May 12	do	17.5	6.69	1.69	0.92	11.37
June 14	do	.....	.....	.....	0.30	.....*a*
July 11	do	.....	.....	.....	0.32	0.08
Aug. 1	do	.....	.....	.....	0.31	.....*a*
Aug. 28	do	.....	.....	.....	.....	.....*b*
Sept. 20	do	.....	.....	.....	.....	.....*b*
Sept. 28	do	.....	.....	.....	.....	.....*b*
Oct. 13	do	.....	.....	.....	.....	.....*b*
Nov. 5	do	.....	.....	.....	.....	.....*b*

a Not enough water to break over weir.
b Creek dry.

DAILY GAUGE HEIGHT AND DISCHARGE of Lodge Creek at Hester's Ranche, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.28	21.0	0.63	4.60	0.91	10.50
2	.....	.....	1.08	15.0	0.43	1.55	0.81	8 10
3	.....	.....	1.05	14.2	0.43	1.55	0.71	6.10
4	.....	.....	1.03	13.8	0.43	1.55	0.71	6.10
5	.....	.....	1.03	13.8	0.43	1.55	0.61	4.10
6	.....	.....	1.03	13.8	0.43	1.55	0.51	2.40
7	.....	.....	1.03	13.8	0.33	0.50	0.51	2.40
8	.....	.....	1.03	13.8	0.33	0.50	0.41	1.30
9	.....	.....	1.03	13.8	0.33	0.50	0.41	1.30
10	.....	.....	1.03	13.8	0.33	0.50	0.41	1.30
11	.....	.....	1.03	13.8	0.33	0.50	0.33	0.50
12	.....	.....	1.23	19.6	0.43	1.55	0.33	0.50
13	.....	.....	1.23	19.6	0.43	1.55	0.36	0.60
14	.....	.....	1.23	19.6	0.31	0.07	0.36	0.60
15	.....	.....	1.43	27.0	0.31	0.07	0.34	0.55
16	.....	.....	1.63	35.0	0.31	0.07	0.33	0.50
17	.....	.....	1.43	27.0	0.31	0.07	0.33	0 50
18	.....	.....	1.43	27.0	0.31	0.07	0.32	0.25
19	.....	.....	1.23	19.6	0.31	0.07	0.32	0 25
20	.....	.....	1.03	13.8	0.31	0.07	0.30	0.00
21	.....	.....	1.03	13.8	0.31	0.07	0.30	0.00
22	.....	.....	0.83	8.6	0.31	0.07	1.16	17.30
23	50*a*	30	0.83	8.6	0.31	0.07	0.51	2.40
24	1.50	30	0.83	8.6	0.31	0.07	0.36	0.60
25	1.50	30	0 63	4.6	0.31	0.07	0.29	0.00
26	1.30	22	0.63	4.6	0.31	0.07	0.29	0.00
27	1.30	22	0.63	4.6	0.31	0.07	0.28	0.00
28	1.10	16	0.63	4.6	0.51	2.40	0.26	0.00
29	1.10	16	0.63	4.6	0.51	2.40	0.12	0.00
30	1.50	30	0.63	4.6	0.91	10.50	0.11	0 00
31	.....	.....	0.63	4.6	.....	.....	0.11	0.005

a Observations commenced.
b Creek dry Aug. 1 to end of year.

Monthly Discharge of Lodge Creek at Hester's Ranche, for 1913.

(Drainage area 205 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (23-30)...	30.00	16.00	24.50	0.120	0.36	389*a*
May.....	35.00	4.60	14.20	0.069	0.080	873
June...	10.50	0.07	1.14	0.006	0.007	68
July.....	17.30	0.00	2.20	0.011	0.013	135*b*
August..						*c*
September..						*c*
October.....						*c*
The period...					0.136	1,465

a Observations started April 23.
b Creek standing in pools July 20-21 and 24-31.
c Creek dry.

MIDDLE CREEK AT MCKINNON'S RANCHE.

This station was established June 21, 1910, by H. R. Carscallen. It is located on the S.W. ¼ Sec. 35, Tp. 5, Rge. 1, W. 4th Mer., about 11 miles southwest of Battle Creek P. O.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to a braced post sunk in the bed of the stream at the left bank. The zero of the gauge (elev. 91.47) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the left bank about five feet from the edge, on the line of the cross section and 664 feet N. 41° 30′ E of the N.E. corner Sec. 27, Tp. 5, Rge. 1, W. 4th Mer.

The channel is almost straight for about 150 feet above and 100 feet below the station. The right bank is high with a gradual slope; the left bank is high and steep. Neither bank is liable to overflow except in extreme flood. The bed of the stream is composed of sand and coarse gravel.

At ordinary stages, discharge measurements are made with a weir, and at high stages with a current meter by wading.

During 1913, the gauge was read by Angus McKinnon.

Springs just above this station keep the creek flowing all summer although a few miles below it is dry a large portion of the season.

Discharge Measurements of Middle Creek at McKinnon's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 19	H. D. St. A. Smith.....	18.6*b*	34.60	0.90	2.64	31.20
June 3.....	do	9.0*b*	4.03	0.26	0.75	1.17
24.....	do	6.8*b*	3.61	0.24	0.78	0.88
July 18.....	do				0.53	0.33*a*
Aug. 14.....	do				0.55	0.35*a*
Sept. 11.....	do				0.49	0.30*a*
Oct. 7	do				0.54	0.33*a*
" 27.....	do	3.5*b*	1.22	0.87	0.53	1.06

a Weir measurement.
b Measurements made at wading section 100 feet downstream.

DAILY GAUGE HEIGHT AND DISCHARGE of Middle Creek near McKinnon's Ranche, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.00	42.0	1.05	2.60	0.62	0.52
2	3.00	42.0	1.10	2.90	0.60	0.47
3	3.00	42.0	1.08	2.80	0.65	0.60
4	3.00	42.0	1.00	2.20	0.70	0.75
5	3.00	42.0	0 95	1.85	0.68	0.69
6	3.00	42.0	0.91	1.65	0.68	0.69
7	4.78	95.0	0.84	.30	0.67	0.66
8	4.32	82.0	0.80	1.11	0.65	0.60
9	5.60	120.0	0.73	0.86	0.65	0.60
10	6.70	153.0	0 70	0.76	0.64	0.57
11	4.48	86.0	0.68	0.69	0.64	0.57
12	4.52	88.0	0.68	0.69	0.64	0.57
13	5.20	108.0	0.74	0.90	0.64	0.57
14	4.55	88.0	1.45	6.30	0.64	0.57
15	4.20	78.0	2.23	19.90	0.64	0.57
16	4.00	72.0	2.10	17.00	0.64	0.57
17	3.30	51.0	1.60	8.20	0.64	0.57
18	3.05	43.0	1.70	9.70	0.64	0.57
19	2.50	27.0	1.45	6.30	1.04	2.50
20	2.34	23.0	1.22	3.90	1.09	2.80
21	2.18	18.8	0.95	1.85	1.14	3.20
22	2.03	15.5	0.88	1.50	1.16	3.40
23	1.97	14.3	0.78	1.04	1.16	3.40
24	1.80	11.2	0.70	0.76	0.78	1.04
25	1.74	10.3	0.67	0.66	0.72	0.82
26	1.55	7.6	0.65	0.60	0.71	0.79
27	1.52	7.2	0.65	0.60	1.05	2.60
28	1.45	6.3	0.63	0.54	1.70	9.70
29	1.42	5.9	0.63	0.54	0.58	0.42
30	1.30	4.6	0.63	0.54	0.57	0.40
31	.....	.....	0.62	0.52	.....	.....

Daily Gauge Height and Discharge of Middle Creek near McKinnon's Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*
1	0.54	0.34	0.53	0.32	0.55	0.36	0.51	0.31
2	0.70	0.76	0.53	0.32	0.55	0.36	0.51	0.31
3	0.60	0.47	0.53	0.32	0.55	0.36	0.51	0.31
4	0.60	0.47	0.53	0.32	0.55	0.36	0.51	0.31
5	0.58	0.42	0.53	0.32	0.55	0.36	0.52	0.32
6	0.58	0.42	0.53	0.32	0.55	0.36	0.53	0.32
7	0.56	0.38	0.54	0.31	0.55	0.36	0.53	0.32
8	0.56	0.38	0.54	0.34	0.55	0.36	0.55	0.32
9	0.55	0.36	0.55	0.36	0.55	0.36	0.53	0.32
10	0.56	0.38	0.54	0.34	0.51	0.31	0.53	0.32
11	0.56	0.38	0.54	0.34	0.52	0.32	0.53	0.32
12	0.57	0.40	0.54	0.34	0.48	0.30	0.53	0.32
13	0.62	0.52	0.54	0.34	0.48	0.30	0.53	0.32
14	0.57	0.40	0.55	0.36	0.48	0.30	0.53	0.32
15	0.54	0.34	0.55	0.36	0.48	0.30	0.53	0.32
16	0.52	0.32	0.55	0.36	0.48	0.30	0.53	0.32
17	0.51	0.31	0.55	0.36	0.47	0.30	0.53	0.32
18	0.53	0.32	1.03	2.40	0.47	0.30	0.53	0.32
19	0.52	0.32	0.83	1.25	0.47	0.30	0.54	0.34
20	0.52	0.32	0.56	0.38	0.47	0.30	0.54	0.34
21	0.53	0.32	0.56	0.38	0.47	0.30	0.54	0.34
22	1.54	7.40	0.55	0.36	0.48	0.30	0.54	0.34
23	0.92	1.70	0.55	0.36	0.48	0.30	0.54	0.34
24	0.72	0.82	0.55	0.36	0.50	0.30	0.54	0.34
25	0.60	0.47	0.56	0.38	0.50	0.30	0.54	0.34
26	0.59	0.44	0.56	0.38	0.50	0.30	0.54	0.34
27	0.56	0.38	0.56	0.38	0.50	0.30	0.54	0.34
28	0.54	0.34	0.56	0.38	0.51	0.31	0.54	0.34
29	0.54	0.34	0.55	0.36	0.51	0.31	0.54	0.34
30	0.54	0.34	0.55	0.36	0.51	0.31	0.54	0.34
31	0.53	0.32	0.55	0.36			0.54	0.34

Monthly Discharge of Middle Creek at McKinnon's Ranche, for 1913.

(Drainage area 123 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	153.00	4.60	48.900	0.398	0.440	2,910
May	19.90	0.52	3.250	0.026	0.030	200
June	9.70	0.40	1.390	0.011	0.010	83
July	7.40	0.31	0.674	0.005	0.006	41
August	2.40	0.32	0.447	0.004	0.005	27
September	0.36	0.30	0.330	0.003	0.003	20
October	0.34	0.31	0.327	0.003	0.003	20
The period					0.497	3,301

MIDDLE CREEK AT ROSS' RANCHE.

This station was established July 20, 1909, by H. R. Carscallen. It is located on the S.W. ¼ Sec. 30, Tp. 5 Rge 29 W. of 3rd Mer. about four miles southwest of Battle Creek, P. O.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream at the right bank and securely stayed. The zero of the gauge (elev. 3290.98) is referred to a permanent iron bench mark (elev. 3297.37 irrigation surveys), situated on the right bank.

The channel is straight for 50 feet above and below the station. The right bank is high, but the left is low and liable to overflow in flood stages of the stream. The bed of the stream is composed of sand and coarse gravel with a little vegetation at the station, and may shift slightly during high water. There is only one channel at low stages but in extreme flood stages, water breaks out over the left bank and forms two channels. The current is sluggish at low stages and moderate at higher stages.

Discharge measurements are made with a weir at ordinary summer stages and with a current meter by wading at high stages.

During 1913, the gauge was read by Maurice Ross.

The stream would be dry most of the summer at this station if it were not for the discharge of a few springs a short distance above. A part of the run-off of the drainage basin above this station is held back by dams at Wright's and McKinnon's ranches and used for irrigation purposes.

DISCHARGE MEASUREMENTS of Middle Creek at Ross' Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 18	H. D. St. A. Smith	13.5	34.00	1.74	2.48	59.30
June 3	do	5.0	1.00	0.56	0.74	0.56
" 25	do	6.5	1.40	0.53	0.63	0.74
July 18	do	.....	.....	.....	0.60	0.20*a*
Aug. 14	do	4.5	1.27	0.68	0.65	0.86
Sept. 12	do	.....	.....	.....	0.62	0.24*a*
Oct. 7	do	.....	.....	.....	0.63	0.24*a*

a Weir measurement.

DAILY GAUGE HEIGHT AND DISCHARGE of Middle Creek at Ross' Ranche, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	0.71	0.47	0.64	0.28
2	.....	.....	0.70	0.44	0.64	0.28
3	.....	.....	0.69	0.41	0 64	0.28
4	1.45	.....	0.67	0.35	0.64	0.28
5	1.22	.....	0.64	0.28	0.64	0.28
6	1.00	.....	0.63	0.25	0.64	0.28
7	0.84	.....	0.61	0.21	0.64	0.28
8	0.70	*a*	0.63	0.25	0.64	0.28
9	4.37	188.00	0.65	0.30	0.64	0.28
10	4.59	203.00	0.68	0.38	0.64	0.28
11	4.85	220.00	0.67	0.35	0.64	0 28
12	4.59	203.00	0.66	0.32	0 64	0 28
13	4.51	197.00	0.66	0.32	0.65	0.30
14	4 22	178.00	0.65	0.30	0.65	0.30
15	4.08	168 00	0.64	0.28	0.65	0.30
16	3.79	148.00	0.63	0.25	0 64	0.28
17	2.67	72.00	0.62	0.23	0 64	0.28
18	2.56	65.00	0.62	0.23	0.64	0.28
19	2.20	42.00	0.64	0.28	0.64	0 28
20	2.12	38.00	0.86	1.50	0.66	0 32
21	2.18	41.00	1.02	3 30	0 68	0 38
22	2.16	40.00	0.93	2.20	0.68	0.38
23	2.07	35.00	0.82	1.16	0 67	0 35
24	1.88	26.00	0.68	0.38	0.66	0.32
25	1.29	8.00	0.66	0.32	0.64	0.28
26	1.06	3.90	0.66	0.32	0.64	0.28
27	0.94	2 30	0.64	0.28	0.64	0.28
28	0.83	1 24	0.64	0.28	0.64	0 28
29	0.73	0.53	0.64	0.28	0.65	0.30
30	0.72	0.50	0.64	0.28	0.66	0.32
31	.....	.....	0.64	0.28	.....	.....

a Ice conditions previous to April 8; not sufficient data to compute discharge.

Daily Gauge Height and Discharge of Middle Creek at Ross' Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.67	0.35	0.65	0.30	0.64	0.28	0.64	0.28
2	0.68	0.38	0.64	0.28	0.64	0.28	0.64	0.28
3	0.68	0.38	0.64	0.28	0.64	0.28	0.64	0.28
4	0.67	0.35	0.64	0.28	0.64	0.28	0.64	0.28
5	0.66	0.32	0.66	0.32	0.64	0.28	0.64	0.28
6	0.65	0.30	0.66	0.32	0.64	0.28	0.64	0.28
7	0.65	0.30	0.66	0.32	0.64	0.28	0.63	0.25
8	0.65	0.30	0.66	0.32	0.64	0.28	0.63	0.25
9	0.64	0.28	0.66	0.32	0.64	0.28	0.63	0.25
10	0.64	0.28	0.65	0.30	0.64	0.28	0.63	0.25
11	0.64	0.28	0.65	0.30	0.64	0.28	0.62	0.23
12	0.64	0.28	0.65	0.30	0.64	0.28	0.63	0.25
13	0.64	0.28	0.65	0.30	0.64	0.28	0.63	0.25
14	0.64	0.28	0.65	0.30	0.64	0.28	0.63	0.25
15	0.64	0.28	0.65	0.30	0.64	0.28	0.63	0.25
16	0.64	0.28	0.65	0.30	0.64	0.28	0.63	0.25
17	0.64	0.28	0.65	0.30	0.64	0.28	0.63	0.25
18	0.64	0.28	0.93	2.20	0.64	0.28	0.63	0.25
19	0.64	0.28	0.78	0.84	0.64	0.28	0.62	0.23
20	0.64	0.28	0.76	0.68	0.64	0.28	0.62	0.23
21	0.64	0.28	0.72	0.50	0.64	0.28	0.63	0.25
22	0.78	0.84	0.71	0.47	0.64	0.28	0.63	0.25
23	0.78	0.84	0.68	0.38	0.64	0.28	0.63	0.25
24	0.77	0.76	0.67	0.35	0.64	0.28	0.63	0.25
25	0.76	0.68	0.65	0.30	0.64	0.28	0.63	0.25
26	0.76	0.68	0.65	0.30	0.64	0.28	0.63	0.25
27	0.75	0.60	0.65	0.30	0.64	0.28	0.63	0.25
28	0.75	0.60	0.64	0.28	0.64	0.28	0.63	0.25
29	0.71	0.47	0.64	0.28	0.64	0.28	0.63	0.25
30	0.67	0.35	0.64	0.28	0.64	0.28	0.63	0.25
31	0.66	0.32	0.64	0.28			0.63	0.25

Monthly Discharge of Middle Creek at Ross' Ranche, for 1913.

(Drainage area 173 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	220.00	0.50	85.50	0.495	0.405	3,731
May	3.30	0.21	0.53	0.003	0.004	33
June	0.38	0.28	0.30	0.002	0.002	18
July	0.84	0.28	0.40	0.002	0.002	24
August	2.20	0.28	0.41	0.002	0.002	25
September	0.28	0.28	0.28	0.002	0.002	17
October	0.28	0.23	0.25	0.002	0.002	15
The period					0.419	3,863

MIDDLE CREEK AT HAMMOND'S RANCHE.

This station was established June 13, 1910, by H. R. Carscallen. It is located at Hammond's ranche, on the N.W. ¼ Sec. 4, Tp. 2, Rge. 29, W. 3rd Mer., about seven miles above the Willow Creek police detachment and about one quarter of a mile above the junction of Middle and Lodge Creeks.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to a post sunk in the bed of the creek near the left bank. An auxiliary gauge, reading from ten to fourteen feet, is located near the top of the left slope opposite the main gauge. The zero of the gauge (elev. 87.60) is referred to a permanent iron bench mark (assumed elev. 100.00), on the left bank. The "B.M." is about six inches above ground and is protected by a mound of stones. It is also used as the initial point for soundings.

The channel is straight for 200 feet above and 125 feet below the station. Both banks are high and fairly steep, free from brush and not liable to overflow. The bed of the stream is sandy and may shift at high stages. The station, being located only a short distance above the junction with Lodge Creek, may be affected by backwater from that creek during high water stages.

Discharge measurements are made at the station by wading and at extreme low stages a weir may be used. High water measurements are not attainable as there is no structure at or near the station to support the engineer in taking the gaugings when the water becomes too deep for wading. The initial point for soundings is the permanent bench mark.

During 1913, the gauge was read by Mrs. D. A. Hammond.

DISCHARGE MEASUREMENTS of Middle Creek at Hammond's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 22	H. D. St. A. Smith	23.0	51.0	0.86	3.30	43.60
May 12	do	19.7	22.2	0.16	1.79	3.66
June 14	do				1.43	0.15*a*
July 11	do				1.34	0.04*a*
Aug. 1	do					....*b*
" 28	do					....*c*
Sept. 20	do					....*c*
Oct. 13	do					....*c*
Nov. 5	do					....*c*

a Weir measurements.
b Not enough to break over 12" weir.
c Creek dry.

Daily Gauge Height and Discharge of Middle Creek near Hammond's Ranche, for 1913.

Day.	April.		May.		June.		July.		August.	
	Gauge Height.	Discharge.	Guage Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.40	114 0	2.66	20 00	1.53	0 82	1.61	1.65	1.36	0.04
2	3.20	40.0	2.56	17.80	1 50	0 56	1.59	1.43	1.27	0.01
3	2.90	28.0	2.41	14 00	1.48	0.43	1.58	1 32	1.26	*b* Nil
4	2.42	14.2	2.26	10 40	1.47	0.37	1.58	1 32	1.26	"
5	2.95	30.0	2.11	7.60	1.47	0.37	1.57	1.22	1.25	"
6	3.60	58.0	2 06	6.90	1.46	0 30	1.56	1 11	1.26	"
7	4.25	102.0	2.04	6.60	1.46	0.30	1.56	1.11	1.26	"
8	3.50	53.0	2 01	6.20	1.46	0.30	1 51	0 65	1.26	"
9	3.70	64.0	2 00	6.00	1.45	0.24	1 46	0.30	1.26	"
10	3.90	76.0	1.97	5.70	1.45	0.21	1.41	0.11	Dry	"
11	*c*8.20	418.0	1.94	5 30	1.45	0 24	1 34	0.03	"	"
12	*c*8.20	418.0	1.83	4.10	1 44	0 21	1.31	0 01	"	"
13	*b*8.20	418.0	1.83	4.10	1.44	0 21	1.29	0.01	"	"
14	*c*8.20	418.0	1 94	5.30	1.43	0.18	1.29	0 01	"	"
15	*c*8.20	418.0	2.18	8 80	1.43	0.18	1 28	0.01	"	"
16	*c*8 20	418 0	2 13	8 00	1.42	0.14	1 28	0 01	"	"
17	7.20	338.0	2 10	7.50	1.42	0.14	1.28	0.01	"	"
18	7.20	338.0	2 06	6.90	1.41	0.11	1 27	0.01	"	"
19	6.20	258.0	2 03	6.40	1.41	0.11	1.27	0.01	"	"
20	*c*6.00	242.0	1.99	5 90	1.40	0 08	1 26	0 00	"	"
21	*a*3 30	44.0	1.96	5.60	1.40	0.08	Dry	0.00	"	"
22	3.30	44.0	1 95	5 40	1.39	0 07	2.16	8.40	"	"
23	3.50	53.0	1.94	5.30	1.98	5 80	2.16	8.40	"	"
24	3.42	49.0	1.92	5.10	1 96	5.60	2.06	6.90	"	"
25	3.20	40.0	1.91	5.00	1.93	5.20	1.98	5.80	"	"
26	3.11	36.0	1 90	4 90	1.85	4.30	1.85	4.30	"	"
27	3.11	36.0	1 86	4.40	1.76	3 30	1.71	2.80	"	"
28	3 06	34.0	1.80	3.80	1.68	2.40	1 64	2.00	"	"
29	2.96	30.0	1.66	2.20	1.64	1.87	1.56	1.11	"	"
30	2.81	25.0	1.62	1.76	1.61	1.65	1.51	0.65	"	"
31	.....	.....	1.56	1.11	.....	.....	1.46	0.30	"	"

a Gauge height interpolated.
b Creek dry for remainder of season.
c These gauge heights are probably a little high on acconut of back water.

Monthly Discharge of Middle Creek at Hammond's Ranche, for 1913.

(Drainage area 301 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	418.00	14.20	155.00	0.515	0.580	9,223
May	20.00	1 11	6.71	0.022	0.020	412
June	5.80	0.11	1.19	0.004	0.004	71
July	8.40	0.01	1.64	0.005	0.006	101
August (1-2)	0.04	0.01	0.002	0.000	0.000	0
September						
October						
The period					0.610	9,807

a Creek dry from August 2 to end of year.

LODGE CREEK AT WILLOW CREEK POLICE DETACHMENT.

This station was established on August 13, 1909, by F. H. Peters. It is located on the S.E. ¼ Sec. 12, Tp. 1, Rge. 29, W. 3rd Mer., about 500 feet east of the house at Willow Creek Police Detachment. It is about 75 miles by trail from Maple Creek, and about 35 miles by trail south of Battle Creek P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the right bank. An auxiliary gauge, reading from ten to fourteen feet is located near the top of the right slope opposite the main gauge. The zero of the gauge (elev. 2721.06) is referred to a concrete bench mark (elev. 2768.00 above mean sea level) which was set by the International Boundary Survey, upon a hill about 500 feet west of the gauge.

The channel is straight for 400 feet above and 300 feet below the station. The right bank, is high, clean, grassy and will not overflow. It forms a bench part way up which is covered at very high stages. The left bank is high and steep and will not overflow. The narrow low-water channel is gravelly, the remainder is grass covered. There is one channel at all stages.

During ordinary stages of flow, discharge measurements are made by wading, and at very low stages a weir is used. A cable structure was erected at this station during 1913 for use in obtaining high water measurements.

During 1913, the gauge was read by William Tudgay and M. Dunnigan.

DISCHARGE MEASUREMENTS of Lodge Creek at Willow Creek Police Detachment, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 23	H. D. St. A. Smith	30.0	37.7	3.55	3.08	134.00
May 14	do	22.4	16.7	1.13	1.86	19.00
June 16	do	.....	.....	.....	1.21	0.18*a*
July 12	do	.....	.....	.....	1.26	1.14*a*
Aug. 9	do	.....	.....	.....	1.10	0.05*a*
Sept. 9	do	.....	.....	.....	.....	.....*b*
Oct. 11	do	.....	.....	.....	.....	.....*b*
Nov. 3	do	.....	.....	.....	.....	.....*b*

a Weir measurement.
b Creek dry.

Daily Gauge Height and Discharge of Lodge Creek at Willow Creek Police Detachment, for 1913.

Day.	April.		May.		June.		July.		August.		September.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.70	88	2 01	27 0	1.60	7.00	1.30	1.18	1.36	1 81	0.56	Nil.
2	2.65	82	2.01	27.0	1.45	3.10	1.30	1.18	1.31	1 28	0.36	"
3	2 75	93	1.96	24 0	1.45	3.10	1.30	1.18	1 26	0 84	0.26	"
4	2 91	112	1 84	17 5	1.45	3.10	1 27	0 93	1 18	0 32	0 16	"
5	3.52	196	1.83	17.0	1 51	4.50	1.27	0.93	1.18	0 32	0.06	"
6	5.42	560	1.86	18.5	1.41	2.50	1.27	0.93	1.16	0.24	Dry.	"
7	7 22	920	1 80	15.5	1 41	2.50	1.27	0.93	1.16	0 24	"	"
8	6.55	786	1 79	15 0	1 36	1.81	1 14	0.16	1 10	0 05	"	"
9	6 46	768	1 80	15.5	1.26	0.84	1.14	0.16	1 08	0 01	"	"
10	6.26	728	1.76	13.5	1.26	0.84	1.14	0.16	1.08	0.04	"	"
11	7 26	928	1.75	13.0	1.26	0 84	1.26	0.84	1.06	0.03	"	"
12	7.65	1,006	1.76	13.5	1.26	0.84	1.29	1.10	1 06	0.03	"	"
13	7.57	990	1.75	13.0	1.26	0.84	1 27	0 93	1.06	0.03	"	"
14	7 58	992	1.86	18 5	1.26	0 84	1.26	0.84	1 06	0.03	"	"
15	7.39	954	1.91	21 0	1 26	0.84	1.26	0.84	0.96	Nil[a]	"	"
16	7.00	876	2.66	83.0	1.21	0.50	1.16	0.24	0 98	"	"	"
17	6.44	764	2.61	78 0	1 19	0 38	1.16	0.24	0 98	"	"	"
18	6.13	702	2.41	58.0	1.19	0.58	1 16	0.24	0 98	"	"	"
19	5.44	564	2.36	53.0	1.20	0.43	1 16	0.24	0 98	"	"	"
20	4.94	455	2.31	49.0	1.13	0.13	1.16	0.24	0.98	"	"	"
21	4.84	436	2.16	38 0	1.30	1.18	1.16	0.24	0.96	"	"	"
22	4.79	426	1.96	24.0	1.26	0.84	1.16	0.24	0.76	"	"	"
23	3.08	134	1.91	21.0	1.26	0 84	1.16	0.24	0.76	"	"	"
24	2.85	105	1.81	16.0	1.30	1.18	1 10	0.05	0.76	"	"	"
25	2.66	83	1.76	13.5	1.41	2.50	1.46	3.30	0.76	"	"	"
26	2.46	62	1.76	13.5	1.32	1.38	1.86	18.50	0.56	"	"	"
27	2.30	48	1.66	9.4	1.48	3.80	1.86	18.50	0.56	"	"	"
28	2.23	43	1.66	9.4	1.46	3.30	1.76	13.50	0.56	"	"	"
29	2.12	35	1.66	9 4	1.44	2.90	1.55	5.50	0.26	"	"	"
30	2 08	32	1.66	9.4	1.31	1.28	1.46	3 80	0 26	"	"	"
31	.....	.....	1.66	9.4	.....	.....	1.36	1.81	0.26	"	"	"

a Water standing in pools.

Monthly Discharge of Lodge Creek at Willow Creek Police Detachment, for 1913.

(Drainage area 803 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	1006.00	32.00	465.000	0.580	0.650	27,705
May	83.00	9.40	24.000	0.031	0.036	1,513
June	7.00	0.13	1.820	0.002	0.003	108
July	18.50	0.05	2.540	0.003	0.004	156
August	1.81	0.00	0.171	0.002	0.002	10
September	.....	.....	.....	.....	.....	..... *a*
October	.....	.....	.....	.....	.....	.....
The period	.....	.....	.....	.....	0.695	29,492

a No flow after August.

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Lodge Creek drainage basin, in 1913

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
April 21....	H.D.St.A.Smith..	Lodge Creek.....	N.E. 36-4-2-4....	15.0	75.4	1.14	87
Oct. 5....	do	Middle Creek.....	S.W. 9-4-29-3....	.....	.....	.....	0.037
July 15....	H. O. Brown....	do	S.E. 33-5-1-4....	4.0	1.85	0.16	0.30

BATTLE CREEK DRAINAGE BASIN.

General Description.

Battle Creek, rises in Tp. 8, Rge. 2, W. 4th Mer., and flows in an easterly direction for about eight miles where it crosses the 4th meridian, then turns in a southeasterly direction and crosses the international boundary in Sec. 3, Tp. 1, Rge. 26, W. 3rd Mer., eventually emptying into Milk River near Chinook, Montana. As is characteristic of the streams in this locality, the valley is narrow and deep near the source and gradually broadens out into large flats and meadows. These large flats are first noticed in the vicinity of Battle Creek P.O. Near the head of the stream the valley is well wooded with fair sized timber, but this diminishes to a growth of willow brush along the banks and finally disappears altogether.

The chief tributaries of Battle Creek are Tenmile Creek, joining it in Sec. 4, Tp. 6, Rge. 29, W. 3rd Mer., and Sixmile Coulee, joining it in Sec. 21, Tp. 6, Rge. 29, W. 3rd Mer. Stations have been established on both of these streams.

There are three stations on Battle Creek, at the following places:—Nash's ranche, Wilkes' ranche and Tenmile police detachment.

Although it will be several years before it reaches its fullest development, the irrigation of the flats along the creek is increasing every year. This, it is expected, will result in a more uniform flow in the creek, as a certain amount of the water diverted by the irrigation ditches will be returned to the creek through seepage.

The principal irrigation schemes under development at the present time are Marshall and Gaff's near Battle Creek P.O., and Richardson's, McKinnon's, Stirling's and Nash's, near Kelvinhurst P.O.

CHEESEMAN DITCH NEAR COULEE.

This station was established on June 24, 1911, by W. A. Fletcher. It is located in the S.W. ¼ Sec. 12, Tp. 8, Rge. 29, W. 3rd Mer., about 50 yards from Ben Cheeseman's house.

The gauge, which is a plain staff graduated to feet and inches, is nailed to a post at the left bank. The zero of the gauge (elev. 96.00) is referred to the top of a stake (assumed elev. 100.00), driven in the ground six feet southwest of the gauge.

The channel is straight for 40 feet above and 30 feet below the station. The bottom of the ditch is composed of clay.

Discharge measurements of ordianry flow are made with a weir. For high discharges a current meter is used. The bench mark is used as the initial point for soundings.

During 1913, the ditch was used for 31 days, but not enough measurements were taken to calculate discharge.

SPANGLER'S DITCH NEAR BATTLE CREEK.

This station was established on July 10, 1911, by W. A. Fletcher. It is located on the S.W. ¼ Sec. 6, Tp. 7, Rge. 28, W. 3rd Mer., about one quarter mile below the intake of the ditch. The station was moved one quarter mile upstream to its present location on June 4, 1912, by G. R. Elliott. It is about one quarter mile above J. M. Spangler's house and the gauging station on Sixmile Coulee.

The gauge, which is a plain staff graduated to feet and inches, by saw cuts, is fixed to a braced plank at the left bank. The zero of the gauge (elev. 96.57) is referred to the top of the final point stake (assumed elev. 100.00) on the left bank.

The channel is straight for 30 feet above and 30 feet below the station. The banks are high, clean, grassy and are not liable to overflow. The bed is soft clay.

Discharge measurements are made with a current meter by wading. The initial point for soundings is the face of a stake six inches high on the right bank marked "I.P."

During 1913, the gauge was read by J. M. Spangler.

Discharge Measurements of Spangler's Ditch at Spangler's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Inches*	*Sec.-ft.*
June 2	H. D. St. A. Smith	6.0	2.10	0.77	6.5	1.62
" 4	H. O. Brown	4.8	2.90	0.58	5.2	1.67
" 10	do	5.8	3.73	0.34	6.7	1.29

Daily Gauge Height and Discharge of Spangler's Ditch at Spangler's Ranche, for 1913.

Day.	May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			0.58	1 80		
2			0.58	1 80		
3			0.58	2 00		
4			0.58	2 24		
5			0.58	2 12		
6			0.58	1 96	*a* 0.17	0 16
7			0.58	1 80	0.17	0.16
8			0.58	1 66	0.17	0 16
9			0.58	1 52	0.17	0.16
10			0.50	1 06	0.17	0 16
11			0.42	0 74	0.17	0.16
12			0.58	1 40	0.17	0 16
13			0.67	1 72	0.17	0.16
14			0.75	2 02	0.17	0.16
15			0.75	2 02	0.17	0 16
16			0.67	1 72	0.17	0 16
17			0.58	1 40	02.5	0 48
18			0.50	1 06	0.25	0.48
19			0.42	0 74	*b* 0.25	0 48
20			0.25	0 36		
21			0.17	0.12		
22			0 17	0 12		
23	*a* 0.25	0.50	0.33	0.68		
24	0.58	1.80	*b* 0.42	1.00		
25	0.67	2.10				
26	0.67	2.10				
27	0.58	1.80				
28	0.58	1.80				
29	0.50	1.48				
30	0.50	1.48				
31	0.50	1.48				

a Headgate opened.
b Headgate closed.

Monthly Discharge of Spangler's Ditch at Spangler's Ranche, for 1913.

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (23-31)	2.10	0.50	1.62			29
June (1-24)	2.24	0.12	1.38			[illegible]
July (6-19)	0.48	0.16	0.228			[illegible]
The period						101

SIXMILE COULEE AT SPANGLER'S RANCHE.

This station was established July 22, 1909, by H. R. Carscallen. On June 11, 1911, it was moved five miles downstream by M. H. French, and is now located on the S.W. ¼ Sec. 6, Tp, 7. Rge. 28, W. 3rd Mer., and is 150 feet from J. M. Spangler's house. It is 34 miles by trail southwest of Maple Creek and six miles north of Battle Creek P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream at the left bank. The zero of the gauge (elev. 96.77) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the left bank in line with the gauging section, and 750 feet east and 290 feet south of the N.E. corner of Sec. 35, Tp. 6, Rge. 29, W. 3rd Mer.

The channel turns through about 90 degrees at the station and is straight for about 50 feet above and 100 feet below. The banks are covered with brush which causes back water during flood stages. The bed of the stream is composed of sand and gravel, but is not liable to shift. There is a large pond of standing water at the station and at low stages there is practically no current.

Discharge measurements are made at a permanent cross section, 850 feet south and about 2000 feet downstream from the gauge, with a current meter by wading. The initial point for soundings is a four inch post on the right bank, 56.2 feet from the final point, which is the permanent bench mark. At high water, discharge measurements are made at the bridge 100 feet below the gauge.

During 1913, the gauge was read by J. M. Spangler.

Water is diverted about one half mile above the station by J. M. Spangler. Water was diverted for one month and a half during 1913. The discharge of Spangler's ditch should be added to obtain the total run-off for the station.

DISCHARGE MEASUREMENTS of Sixmile Coulee at Spangler's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 25	H. D. St. A. Smith	9.7	10.60	1.12	2.48	11.90
June 4	do	6.0	1.98	0.80	1.84	1.58
" 4	H. O. Brown	5.9	3.07	0.85	1.89	2.60
" 10	do	.....	.....	.....	1.60	0.22*a*
" 26	H. D. St. A. Smith	5.5	3.48	1.06	1.98	3.70
July 26	do	6.0	2.03	0.69	1.83	1.41
Aug. 15	do	.....	.....	.....	1.56	0.08*a*
Sept. 10	do	.....	.....	.....	1.49	.....*b*
Oct. 3	do	.....	.....	.....	1.51	....*b*
" 26	do	4.5	1.65	0.81	1.67	1.34

a Weir measurement.
b Too small to measure.

Daily Gauge Height and Discharge of Sixmile Coulee at Spangler's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.57	13.80	1.89	2.50
2	3.31	29.0	2.65	15.40	1.88	2.30
3	3.14	26.0	2.54	13.10	1.87	2.20
4	3.01	23.0	2.42	10.70	1.84	1.85
5	4.49	54.0	2.36	9.50	1.81	1.55
6	4.59	56.0	2.34	9.20	1.69	0.60
7	4.34	51.0	2.29	8.30	1.64	0.36
8	4.19	48.0	2.36	9.50	1.63	0.32
9	3.76	39.0	2.39	10.10	1.61	0.24
10	3.56	34.0	2.42	10.70	1.60	0.20
11	3.39	31.0	2.34	9.20	1.59	0.17
12	4.10	46.0	2.25	7.60	1.62	0.28
13	4.89	62.0	2.29	8.30	1.59	0.17
14	4.42	53.0	2.56	13.60	1.62	0.28
15	4.28	50.0	2.42	10.70	1.60	0.20
16	4.04	45.0	2.38	9.90	1.59	0.17
17	3.97	43.0	2.34	9.20	1.58	0.15
18	3.70	38.0	2.29	8.30	1.58	0.15
19	3.27	28.0	2.29	8.30	1.57	0.12
20	3.05	24.0	2.26	7.70	1.62	0.28
21	2.90	21.0	2.24	7.40	1.83	1.75
22	2.78	18.2	2.21	6.90	1.81	1.55
23	2.72	16.9	2.14	5.80	1.80	1.45
24	2.62	14.8	1.74	0.93	1.79	1.36
25	2.53	12.9	1.94	3.00	1.94	3.00
26	2.48	11.9	1.91	2.60	2.37	9.70
27	2.39	10.1	1.91	2.60	2.01	3.90
28	2.38	9.9	1.90	2.50	2.02	4.00
29	2.36	9.5	1.89	2.50	1.99	3.60
30	2.14	5.8	1.96	3.20	1.93	2.90
31			1.91	2.60		

Daily Gauge Height and Discharge of Sixmile Coulee at Spangler's Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.90	2.50	1.57	0.12	1.46	Nil.	1.51	0.03
2	1.92	2.70	1.60	0.20	1.43	"	1.51	0.03
3	1.96	3.20	1.50	0.02	1.39	"	1.52	0.04
4	1.99	3.60	1.46	0.01	1.34	"	1.55	0.07
5	2.09	5.00	1.58	0.15	1.31	"	1.56	0.10
6	1.99	3.60	1.54	0.06	1.28	"	1.57	0.12
7	1.91	2.60	1.56	0.10	1.26	"	1.64	0.36
8	1.83	1.75	1.59	0 17	1.24	"	1.68	0.55
9	1.80	1.45	1.55	0.07	1.22	"	1.72	0.79
10	1.73	0.86	1.53	0.05	1.19	"	1.73	0.86
11	1.70	0.65	1.51	0 03	1.18	"	1.75	1.00
12	1.67	0.50	1.49	0.02	1.17	"	1.76	1.09
13	1.81	1.55	1.50	0.02	1.16	"	1.77	1.18
14	1.95	3.10	1.59	0.17	1.15	"	1.75	1.00
15	1.87	2.20	1.55	0 07	1.14	"	1.73	0.86
16	1.82	1.65	1.53	0 05	1.14	"	1.73	0.86
17	1.79	1.36	1.51	0.03	1.13	"	1.72	0.79
18	1.72	0.79	1.72	0.79	1.13	"	1.71	0.72
19	1.67	0.50	1.94	3.00	1.12	"	1.70	0.65
20	1.64	0.36	1.81	1.55	1.12	"	1.70	0.65
21	1.64	0.36	1.74	0.93	1.12	"	1.72	0.79
22	1.79	1.36	1.67	0.50	1.24	"	1.71	0.72
23	1.83	1.75	1.62	0.28	1.51	*a*0.03	1.70	0.65
24	1.79	1.36	1.59	0.17	1.50	0.02	1.69	0.60
25	1.76	1.09	1.55	0.07	1.49	0.02	1.69	0.60
26	1.73	0.86	1.50	0.02	1.48	0.01	1.68	0.55
27	1.70	0.65	1.48	0 01	1.48	0.01	1.68	0.55
28	1.68	0.55	1.46	0.01	1.50	0.02	1.66	0.45
29	1.65	0.40	1.44	*a*Nil.	1.51	0.03	1.64	0.36
30	1.62	0.28	1.43	"	1.52	0.04	1.63	0.32
31	1.59	0.17	1.45	"	.....	.....	1.59	0.17

a Creek standing in pools August 29—Sept. 22.

Monthly Discharge of Sixmile Coulee at Spangler's Ranche, for 1913.

(Drainage area 44 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (2-30)	62.00	.580	31.400	0.714	0.770	1,806
May	15.40	0.93	7.840	0.178	0.205	482
June	4.00	0.12	1.580	0.036	0.040	94
July	5.00	0.17	1.570	0.036	0.040	96
August	3.00	0.00	0.280	0.006	0.007	17*a*
September	0.04	0.00	0.006	0.000	0.000	0*a*
October	1.18	0.03	0.565	0.013	0.013	34
The period	.....	.....	.....	.....	1.077	2,529

a Creek not running Aug. 29—Sept. 22.

LINDNER'S DITCH NEAR BATTLE CREEK.

This station was established July 26, 1910, by H. R. Carscallen. It is located on the N.W. ¼ Sec. 10, Tp. 6, Rge. 29, W. 3rd Mer., about 100 feet west of the surveyed trail to Maple Creek. It is about a quarter of a mile south of Battle Creek P. O. and about 500 yards below the intake of the ditch.

The gauge is a plain staff, graduated to feet and hundredths, driven firmly into the bed of the ditch near the right bank about twelve feet upstream from the weir.

The channel is straight for 200 feet above and 150 feet below the station, where it curves sharply to the right and enters Lindner Bros' hay meadow, and is diverted into a number of different laterals for irrigation purposes. The bed of the ditch is composed of clay and coarse gravel. The current is swift below the station.

Discharge measurements are made by means of a 42 inch rectangular sharp-crested weir with complete end contractions.

During 1913, the gauge was read by Phil Lindner.

The discharge at this station must be added to that of Battle Creek at Tenmile police detachment, when computing the total run-off for the latter station.

DAILY GAUGE HEIGHT AND DISCHARGE of Lindner's Ditch near Battle Creek, for 1913.

Day.	April.		May.		June.		July.		August.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1					0.40	3.00	0.50	4 00	0 30	1.88
2					0.40	3.00	0.50	4 00	0 30‡	1.88
3					0.40	3.00	0.50	4.00		
4					0.90	9.00	0.50	4.00		
5					0.44†	3.3	0.90	9.00	0.50	4.00
6					0.44	3.3	0.90	9.00	0.90	9.00
7					0.55	4.6	0.68	6.30	0.90	9.00
8					0.61	5.3	0.45	3.40	0.90	9.00
9					0.61	5.3	0.45	3.40	0.50	4.00
10					0.61	5.3	0.45	3.40	0.50	4.00
11					0.61	5.3	0.28	1.70	0.50	4.00
12					0.50	4.0	0.10	0.37	0.50	4.00
13					0.50	4.0	0.15	0.67	0.50	4.00
14					0.50	4.0	0 15	0.67	0.50	4.00
15	0.45*	3.4			0.50	4.0	0.15	0.67	0.50	4.00
16	0.20	1.18			0.50	4.0	0 15	0.67	0.50	4.00
17	0.20	1.18			0.50	4.0	0.55	4.60	0.50	4.00
18					0.50	4 0	0 95	10.20	0.50	1 00
19					0.50	4.0	0.95	10.20	0.50	1 00
20					0.50	4.0	0.50	4.00	0.50	4.00
21					0.50	4.0	0.50	4.00	0.80	7.80
22					0.50	4.0	0.50	4.00	0.80	7.80
23					0.55	4.6	0.50	4 00	0 80	7.80
24					0.55	4.6	0.50	1 00	0 80	7.80
25					0.55	4.6	0.50	4.00	0 80	7.80
26					0.55	4.6	0.50	4.00	0.80	7.80
27					0.55	4.6	0.50	4.00	0.50	4.00
28					0.55	4.6	0:50	4.00	0.50	4.00
29					0.55	4.6	0.50	4.00	0.30	1.88
30					0.50	4.0	0.50	4.00	0.30	1.88
31					0.50	4.0			0.30	1.88

* Headgate broken.
† Headgates opened.
‡ Headgates closed.
Gauge heights are heads on 42 inch weir.

MONTHLY DISCHARGE of Lindner's Ditch near Battle Creek, for 1913.

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (15-17)	11.40	1.18	1.92	.....	.....	11*a*
May (5-31)	5.30	3.30	4.32	.....	.....	231*b*
June	10.20	0.37	4.21	.....	.....	250
July	9.00	1.88	5.01	.....	.....	308
August (1-2)	1.88	1.88	1.88	.....	.....	7*c*
The period	.....	.....	.....	.....	.....	807

a Headgates broken April 15-17.
b Headgates opened May 5th.
c Headgates closed August 2nd.

TENMILE CREEK AT TENMILE POLICE DETACHMENT.

This station was established July 21, 1909, by H. R. Carscallen. It is located on the S.E. ¼ Sec. 4, Tp. 6, Rge. 29, W. 3rd Mer. It is about 2,500 feet north of the steel highway bridge and gauging station on Battle Creek, and about 1,000 feet north of Tenmile police detachment.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream at the right bank, 500 feet above the junction of this stream with Battle Creek. The zero of the gauge (elev. 95.94) is referred to the permanent iron bench mark at the Battle Creek station (assumed elev. 100.00).

The channel is straight for 100 feet above and 30 feet below the station. Both banks are high, clean, grassy, and are not liable to overflow. The bed is composed of sand and coarse gravel. The current is swift above and below but is sluggish at the gauge.

Discharge measurements are made above the gauge at ordinary stages by a weir, and at high stages with a meter by wading. The initial point for soundings is a four inch stake with "I.P" carved on the face, on the left bank, 70 feet upstream from the gauge.

During 1913, the gauge was read by W. G. Paterson.

DISCHARGE MEASUREMENTS of Tenmile Creek at Tenmile, in 1913.

DATE	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*S..-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 18	H. D. St. A. Smith	5.0	1.80	1.64	4.05	2.96
June 4	do	.....	.....	.....	3.84	0.43*a*
" 13	H. O. Brown	2.6	0.94	0.55	3.79	0.52
" 26	H. D. St. A. Smith	2.7	0.50	0.64	3.75	0.32
" 23	do	3.5	1.41	0.40	3.75	0.57
Aug. 15	do	4.0	0.80	0.30	3.75	0.24
Sept. 13	do	.....	.....	.....	3.68	0.18*a*
Oct. 28	do	.....	.....	.....	3.74	0.24*a*

a Weir measurement.

Daily Gauge Height and Discharge of Tenmile Creek at Tenmile Police Detachment, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4 09	3.40	3.85	0 95	3.85	0.95
2	4.10	3 50	3.85	0 95	3.84	0.88
3	4.00	2.40	3.84	0.88	3 84	0.88
4	4.05	3.00	3.84	0.88	3.81	0.88
5	4 20	4.50	3.86	1.04	3.83	0.80
6	4 98	12 40	3.89	1.33	3 82	0.73
7	5.40	16.70	3 87	1.14	3 80	0.58
8	*a*5 05	13.20	3 88	1 23	*a*3.80	0.58
9	4.70	9.60	3.84	0 88	3 80	0.58
10	4.63	8.90	3.84	0.88	3.80	0.58
11	4 70	9.60	3.84	0 88	*a*3.80	0.58
12	4.60	8.60	3 83	0.80	3.80	0.58
13	4.93	11.90	3.80	0.58	3.79	0.53
14	4.73	9.90	3.85	0.95	3.78	0.48
15	*a*4.54	7.90	3.85	0.95	*a*3.77	0.42
16	*a*4.36	6 10	3.83	0.80	3.76	0.37
17	4.20	5.00	3.85	0.95	3.75	0.32
18	4 05	3.00	3 84	0.88	3.75	0.32
19	*a*4 04	2 80	3 85	0 95	3 76	0.37
20	4.03	2.70	3.85	0.95	3.78	0.48
21	4.00	2 40	3.85	0.95	3.76	0.37
22	*a*3.92	1.62	3.85	0.95	3.75	0.32
23	3.85	0.95	3.85	0.95	3.75	0.32
24	3.84	0.88	3.85	0.95	3.75	0.32
25	3.92	1.62	*a*3.85	0.95	3.75	0.32
26	3.90	1.42	3.85	0.95	3.81	0.65
27	3.89	1.33	3.85	0.95	3.79	0.53
28	3 88	1.23	*a*3.85	0.95	3.82	0.73
29	*a*3.87	1.14	*a*3.85	0.95	3.78	0.48
30	3.86	1.04	3.85	0.95	3.75	0.32
31	.....	.....	3.85	0.95	.....	.....

a Gauge heights interpolated.

Daily Gauge Height and Discharge of Tenmile Creek at Tenmile Police Detachment, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.75*a*	0.32	3.75	0 32	3.75	0.24	3 74	0.23
2	3.76	0.37	3.75	0.32	3.75	0.24	3.74	0.23
3	3.80	0.58	3.74	0 30	3.75	0.24	3.74	0.23
4	3.85	0.95	3.74	0.30	3.75	0.24	3.74	0.23
5	3.80	0.58	3.76	0.37	3.75	0.24	3 75	0.24
6	3.76	0.37	3.75	0 32	3 75	0.24	3.75	0.24
7	3.75	0.32	3.75	0.32	3.74	0.23	3.75	0.24
8	3.75	0.32	3.75	0.32	3.74	0.23	3.75	0.24
9	3.80*a*	0.58	3.75	0.32	3.74	0.23	3.75	0.24
10	3.85	0.95	3.75*a*	0 32	3.73	0.22	3 74	0.23
11	3.86	1.04	3.74	0 30	3 73	0.22	3.74	0.23
12	3.85	0.95	3.74	0.30	3.72	0.21	3.74	0.23
13	3.84	0.88	3.74	0 30	3.72	0.21	3.74	0.23
14	3.80	0.58	3.74	0 30	3.72	0.21	3.74	0.23
15	3.78	0.48	3.75	0.32	3.72	0.21	3.74	0.23
16	3.75	0.32	3 74	0.23	3 72	0.21	3.74	0.23
17	3.75	0.32	3.74*a*	0.23	3.72	0.21	3.74	0.23
18	3.74	0.30	3 75	0.24	3 74	0.23	3.74	0.23
19	3.74	0.30	3.75*a*	0 24	3.73	0.22	3.74	0.23
20	3.73	0.27	3.75	0.24	3.73	0.22	3.74	0.23
21	3.78*a*	0.48	3.74	0.23	3.73	0.22	3.74	0.23
22	3.83	0.80	3.74	0.23	3.75	0.24	3 74	0.23
23	3.80	0.58	3.74	0.23	3.75	0.24	3.74	0.23
24	3.75	0.32	3.74*a*	0.23	3.75	0.24	3.74	0.23
25	3.75	0.32	3.74	0.23	3.75	0 24	3.74	0.23
26	3.75	0.32	3.74	0 23	3.74	0.23	3.74	0.23
27	3.75	0.32	3.74	0.23	3.74	0.23	3.74	0.23
28	3.75*a*	0.32	3.74	0.23	3.74	0.23	3.74	0.23
29	3.75	0.32	3.74	0.23	3.74	0.23	3.74	0.23
30	3.75	0.32	3.74	0.23	3.74	0 23	3.74	0.23
31	3.75	0.32	3 75	0.24	.....	.....	3.74	0.23

a Gauge heights interpolated.

Monthly Discharge of Tenmile Creek at Tenmile Police Detachment, for 1913.

(Drainage area 24 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	16.70	0.88	5.290	0.220	0.24	315
May	1.33	0.58	0.945	0.039	0.04	58
June	0.95	0.32	0.542	0.022	0.02	32
July	1.04	0.27	0.490	0.020	0.02	30
August	0.37	0.23	0 272	0.011	0.01	17
September	0.24	0.21	0.227	0.009	0 01	..14
October	0.24	0.23	0 232	0.010	0.01	14
The period					0.35	480

BATTLE CREEK AT TENMILE POLICE DETACHMENT.

This station was established June 3, 1909, by F. T. Fletcher. It is located below the mouth of Tenmile Creek, at the highway bridge on the surveyed trail from Maple Creek to Tenmile, and about 400 yards from the Tenmile police detachment. It is practically in the centre of the N.E. ¼ Sec. 33, Tp. 5, Rge. 29, W. 3rd Mer., about two miles south of Battle Creek Post Office and 55 miles south of Maple Creek. The bridge is a steel structutre of the pony truss type, consisting of one 80 foot span, supported by two timber, rock-filled piers and having a twenty foot approach at each end of the bridge. There is only one channel at all ordinary stages of the stream, but owing to the presence of the two piers supporting the truss there are three channels at times of floods.

The gauge, which is of the standard chain type, is located about the centre of the steel truss and is securely fastened to the guard-rail on the downstream side of the bridge. The length of the chain from the bottom of the weight to the marker is 19.11 feet. The zero of the gauge(elev. 86.84) is referred to a permanent iron bench mark (assumed elev. 100.00) at the northeast corner of the bridge. The bench mark stands about three inches above ground and is well protected by rock. It is nine feet southwest of road diversion pin "R.5" and thirty feet northeast of the north end of the bridge pier.

The channel is straight for 500 feet above and 300 feet below the station. Both banks are high and not liable to overflow except in extreme floods, when the water breaks over the right bank some distance above the station and flows around the bridge. The right bank is free of brush for some distance above and below the station; the left bank is sparsely covered with willows near the station. The bed of the stream is sandy and may shift somewhat in in high stages of the stream. The current is very sluggish, and at very low stages vegetation appears in the bed of the stream at the station. During the summer months there is a heavy growth of weeds in the bottom of the channel which retards the water and alters conditions at the station.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the inner face of the right abutment. Low-water measurements are made by wading near the bridge.

During 1913, the gauge was read by W. G. Paterson.

DISCHARGE MEASUREMENTS of Battle Creek at Tenmile Police Detachment, in 1913.

Date	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 18	H. D. St. A. Smith	37.0	117.0	1.31	4.55	154.00
June 2	do	32.8	62.0	0.53	3.00	33.20
" 13	H. O. Brown	19.8	23.6	1.14	.....	27.50
" 23	H. D. St. A. Smith	31.5	54.6	0.38	2.80	20.60
July 17	do	21.0	19.1	0.80	2.71	15.20
" 23	do	22.5	24.4	1.01	2.93	24.80
Aug. 14	do	22.0	18 8	0.72	2.65	13.50
Sept. 13	do	19.0	11.9	0.34	2.50	4.05
Oct. 7	do	20.0	15.6	0.80	2.72	12.60
" 28	do	20.0	11.1	0.70	2.55	7.73

DAILY GAUGE HEIGHT AND DISCHARGE of Battle Creek at Tenmile Police Detachment, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.80	180	3.35	56	3.05	36.0
2	4.83	183	3.45	62	3.00	33.0
3	4.83	183	3.41	60	2.98	31.0
4	4.80	180	3.35	56	2.80	19.9
5	5.50	262	3.27	50	2.73	16.2
6	7.50	517	3.27	50	*a*2.69	14.2
7	6.29	360	3.30	52	2.65	12.2
8	5.10	214	3.32	54	2.74	16.7
9	4.31	131	3.34	55	2.73	16.2
10	4.70	169	3.35	56	2.73	16.2
11	5.08	212	3.90	96	*a*2.74	16.7
12	5.91	311	3.96	101	2.75	17.2
13	8.06	591	3.89	87	*a*2.74	16.7
14	9.10	736	3.82	82	2.73	16.2
15	6.60	400	3.70	80	2.70	14.7
16	5.74	291	3.64	76	2.55	7.6
17	5.02	204	3.63	75	2.49	5.0
18	4.55	154	3.45	62	2.48	4.5
19	4.51	150	3.40	59	*a*2.62	10.9
20	4.54	153	3.38	58	2.77	18.2
21	4.41	140	3.35	56	2.82	21.0
22	*a*4.15	116	3.34	55	*a*2.81	20.0
23	3.90	96	3.34	55	2.80	19.0
24	3.66	77	3.30	52	*a*2.95	29.0
25	3.52	67	3.29	51	*a*3.05	36.0
26	3.43	61	3.29	51	3.10	39.0
27	3.44	62	*a*3.23	47	3.20	45.0
28	3.45	62	*a*3.17	43	3.70	80.0
29	*a*3.42	60	3.12	40	3.80	88.0
30	3.39	58	3.10	39	2.93	28.0
31	.....	.....	30.8	38	.....	.....

a Gauge height interpolated.

Daily Gauge Height and Discharge of Battlle Creek at Tenmile Police Detachment for 1913.

Day	July.		August.		September.		October.	
	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.91	26.0	2.44	2.8	2 45	3 2	2 55	7.6
2	2.90	26.0	2 50	5.4	2 44	2.8	2.55	7.6
3	2.95	29.0	2.48	4.5	2.44	2 8	2.53	6.6
4	2.98	32.0	2 45	3 2	2.44	2 8	2 53	6.6
5	3.12	40.0	2 50	5 4	2 44	2.8	2 57*a*	8.6
6	2.98	32 0	2.47	4.1	2 43	2.4	2 60*a*	10.0
7	*a*2.79	19.3	2.48	4.5	2 43	2 4	2 64	11.8
8	2 70	14 7	2 53	6.6	2 43	2 4	2 65	12.2
9	2 65	12.2	2.54	7.2	2.45	3.2	2.63	11.3
10	2 75	17.2	*a*2.55	7.6	2.46	3.7	2.65	12.2
11	2.76	17 7	2 56	8 1	2 45	3 2	2 61	10.4
12	2.77	18 2	2 55	7 6	2.44	2.8	2 63*a*	11.3
13	2 85	23.0	2.56	8 1	2.46	3.7	2 65	12.2
14	2 83	22.0	2 55	7.6	2 46	3.7	2.70	14.7
15	2.87	24.0	2.60	10.0	*a*2.47	4.1	2.70	14.7
16	2.76	17.7	2 65	12.2	*a*2.48	4.5	2 69	14.2
17	2 68	13 7	2 78	18.8	2 49	5 0	2 68	13.7
18	2 60	10 0	2.90	26.0	2 42	2 0	2 68	13.7
19	*a*2 59	9 5	2 88	25 0	2.44	2.8	2 67	13.2
20	2 58	9.0	2.78	19 8	2.40	1.2	2.65	12.2
21	2.55	7.6	2 74	16 7	*a*2 45	3.2	2.64	11.8
22	2.80	19.9	2.67	13 2	2.50	5.4	2 64	11.8
23	2 85	23 0	2.60	10 0	2 88	24.0	2.67	13.2
24	2.81	20 0	2 54	7.2	2.83	22 0	2 64	11.8
25	2.73	16 2	*a*2.52	6 3	2.76	17.7	2.63	11.3
26	*a*2 64	11.8	*a*2.51	5 9	2 67	13 2	2 61*a*	10.4
27	2 55	7 6	*a*2.49	5.0	2 57	8 6	2.60	10.0
28	2.50	5.4	2.48	4.5	*a*2.57	8 6	2 61	10.4
29	*a*2.48	4 5	2.46	3.7	2.57	8 6	2.63	11.3
30	2.46	3 7	2 46	3.7	2.57	8.6	2 65	12.2
31	2.45	2 4	2.45	3.2	2.56	8.1	2 67	13.2

a Gauge heights interpolated.

Monthly Discharge of Battle Creek at Tenmile Police Detachment, for 1913.

(Drainage area 201 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	736.0	58.0	213.00	1.060	1.18	12,674
May	101.0	38.0	59.80	0.298	0.34	3,677
June	88.0	4.5	24.80	0.123	0.14	1,476
July	40.0	2.4	17.30	0.086	0.10	1,064
August	26.0	2.8	8.83	0.044	0.05	543
September	24.0	1.2	6.08	0.030	0.03	362
October	14.7	6.6	11.40	0.057	0.06	701
The period					1.90	20,497

MARSHALL AND GAFF DITCH NEAR TENMILE POLICE DETACHMENT.

This station was established on July 11, 1911, by W. A. Fletcher. It is located in the N. E. ¼ Sec. 33, Tp. 5, Rge. 29, W. 3rd Mer., about one half mile below the regular station, upon Battle Creek near Tenmile police detachment.

The gauge, which is a plain staff graduated in feet and inches, is nailed to a post sunk in the ditch near the right bank, 250 feet below the headgate. The zero of the gauge is referred to the top of a three inch stake on the right bank near the gauge.

The channel is straight for 100 feet above and 40 feet below the station. The bed is muddy and covered with weeds.

Measurements are made at the station with a current meter by wading. The initial point for soundings is the bench mark.

Not sufficient daily gauge height records were received during 1913 to accurately compute the discharge. Records at a point three miles downstream are given under Gaff ditch.

DISCHARGE MEASUREMENTS of Marshall and Gaff Ditch near Tenmile Police Detachmen t in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 4	H. D. St. A. Smith	7.5	4.75	0.54	0.43	2.54
" 23	do	10.0	9.68	1.67	1.00	16.24
July 3	H. O. Brown	8.1	5.82	0.33	0.36	1.90

GAFF DITCH NEAR TENMILE POLICE DETACHMENT.

This station was established on July 11, 1911, by W. A. Fletcher. It is located on the S.W. ¼ Sec. 25, Tp. 5, Rge. 29, West of the 3rd Mer., about half a mile from Mr. Gaff's house.

The gauge, which is a plain board divided into feet and inches, is nailed to a post at right bank. The zero of the gauge (elev. 96.90) is referred to the top of a stake driven in the the ground three feet southwest of the gauge (assumed elev. 100.00).

The channel is straight for 200 feet above and 300 feet below the station. The bottom of the ditch is composed of a sandy loam.

Discharge measurements are made with a current meter by wading. The initial point for soundings is the bench mark stake.

During 1913, the gauge was read by J. A. Gaff.

DISCHARGE MEASUREMENTS of Gaff Ditch near Tenmile Police Detachment, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 31	H. D. St. A. Smith	10.0	8.82	1.38	1.50	12.20
June 23	do	6.0	3.10	0.49	0.50	1.53
July 3	H. O. Brown	.....	.....	.....	0.38	0.72*a*

a Weir measurement.

Daily Gauge Height and Discharge of Gaff Ditch near Tenmile Police Detachment for 1913.

Day.	May.		June.	
	Gaug Height.	Dis-charge.	Gauge Height.	Dis-charge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.67	14.6
2			1.83	17.0
3			1.75	15.2
4			1.50	12.2
5			1.46	11.6
6			1.46	11.6
7			1.50	12.2
8			1.58	13.4
9			1.25	8.8
10			1.17	7.8
11			1.00	5.9
12			1.50	12.2
12			1.50	12.2
14			1.33	10.0
15			1.33	10.0
16			b 1.33	10.0
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31	a 1.50	12.2		

a Gates opened May 31.
b Gates closed June 16.

Monthly Discharge of Gaff Ditch near Tenmile Police Detachment, for 1913.

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (31)	12.2	12.2	12.2			24
June (1-16)	17.0	5.9	11.5			365
The period						389

BATTLE CREEK AT WILKES' RANCHE.

This station was established July 5, 1910, by H. R. Carscallen. On May 29, 1912, it was moved seven miles downstream by G. R. Elliott. It is located on the N.W. ¼ Sec. 33, Tp. 5, Rge. 27, W. 3rd Mer., and is twelve miles straight east of Tenmile police detachment and about ten miles north of Kelvinhurst Post Office.

The gauge, which is a plain staff graduated to feet and hundredths is nailed to a well-braced post sunk in the bed of the stream at the left bank, and is 120 feet from Wilkes' house. The zero of the gauge (elev. 90.01) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank 750 feet downstream from the gauge.

The channel curves at the gauge. Both banks are fairly high, sandy and not liable to overflow. The bed is composed of clean sand and is somewhat shifting.

Discharge measurements are made with a current meter by wading. The initial point for soundings is a five inch stake marked "I.P." in red paint, located on the left bank, 1700 feet downstream from the gauge. The final point, 171 feet distant, is 654 feet north and 255 feet east of the quarter mound east of Sec 32, Tp. 5, Rge. 27, W. 3rd Mer.

During 1913, the gauge was read by Mrs. Bertha Wilkes.

Water was diverted in 1913 during June by Marshall and Gaff's ditch, twenty miles above this station.

DISCHARGE MEASUREMENTS of Battle Creek at Wilkes' Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 25	H. D. St. A. Smith	33.5	32.00	2.67	2.76	85.6
May 16	do	34.4	28.20	2.82	2 55	70.4
June 18	do	16.0	45.00	1.45	1.50	6.5
July 15	do	22.0	11.10	1.76	1.75	19.7
Aug. 12	do	20.0	7.90	1.27	1.60	10.1
Sept. 16	do	25.5	8.78	0.44	1.39	3.8
Oct. 8	do	20.0	8.02	1.69	1.64	13.5
" 31	do	21.0	6.42	1.13	1.74	7.1

DAILY GAUGE HEIGHT AND DISCHARGE of Battle Creek Wilkes' Ranche, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.50	66	1.98	33.0
2			2.53	69	1.92	29.0
3			2.56	71	1.84	24.0
4			2.51	67	1.82	23.0
5	5.03	307	2.40	60	1.84	24.0
6	5.14	314	2.30	53	1.72	17.9
7	5.67	372	2.22	48	1.66	14.6
8	5.98	406	2.34	56	1.64	13.5
9	5.13	313	2.38	58	1.64	13.5
10	4.76	272	2.30	53	1.65	14.0
11	4.72	268	2.41	60	1.63	13.0
12	4.97	295	2.54	69	1.62	12.5
13	5.53	357	2.60	74	1.66	14.6
14	6.32	444	2.66	78	1.67	15.1
15	5.94	402	2.66	78	1.67	15.1
16	5.90	398	2 57	72	1.66	14.6
17	3.96	188	2.54	69	1.65	14.0
18	3.46	143	2.50	66	1.61	12.0
19	3.40	138	2.46	64	1.61	12.0
20	3.48	145	2.40	60	1.61	12.0
21	3.38	136	2.39	59	1 76	20.0
22	3 26	126	2.38	58	1.65	14.0
23	3.04	108	2.35	56	1.86	26.0
24	2.90	97	2.30	53	1.86	26.0
25	2.72	86	2.27	51	1.86	26.0
26	2.65	78	2.27	51	1.95	31.0
27	2.60	74	2.23	49	1.90	28.0
28	2.53	69	2.22	48	1.96	32.0
29	2.59	73	2.17	45	2.01	35.0
30	2.55	70	2.14	43	2.15	44.0
31			2.09	40		

Daily Gauge Height and Discharge of Battle Creek near Wilkes' Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.98	33.0	1.60	11.5	1.48	6.8	1 57	10.3
2	1.98	33.0	1.60	11.5	1.48	6 8	1 57	10.3
3	1 86	26.0	1.60	11.5	1.46	6.1	1 60	11.5
4	1.90*a*	28.0	1.54	9.1	1.46	6 1	1.60	11.5
5	1.94*a*	30.0	1 52	8.3	1.46	6.1	1.56	9.9
6	1.98	33.0	1.52	8.3	1.44	5.6	1 53	8.7
7	1.92*a*	29 0	1.52	8.3	1.44	5.6	1.50	7.5
8	1.86	26 0	1.52	8.3	1.44	5.6	1.59	11.1
9	1.81	23.0	1.49	7.2	1 43	5.4	1.62	12.5
10	1.78	21.0	1.49	7.2	1.43	5.4	1.66	14.6
11	1.70	16 8	1.49	7 2	1.43	5.4	1.61	12.0
12	1.59	11.0	1.52	8 3	1.41	5.0	1.56	9.9
13	1.79	22.0	1.52	8 3	1.39	4.7	1.52	8.3
14	1.78	21.0	1.54	9.1	1 38	4.6	1.50	7.5
15	1.73	18.4	1.62	12.5	1.38	4.6	1.48	6.8
16	1 77	21.0	1 70	16 8	1.38	4 6	1.49	7.2
17	1.76	20 0	1.96	32 0	1 37	3.8	1.47	6.4
18	1.70	16 8	1.96	32 0	1.39	4 7	1.52	8.3
19	1.67	15 1	1 96	32.0	1 39	4 7	1.56	9.9
20	1 62	12 5	1.90	28 0	1.43	5 4	1.57	10.3
21	1.60	11.5	1.84	24.0	1.43	5 4	1.56	9.9
22	1 80	22 0	1.82	23 0	1.47	6 4	1 59	11.1
23	1.72	17.9	1.68	15.6	1.47	6 4	1.59	11.1
24	1.83	24.0	1.50	7 5	1.51	7.9	1 65	14.0
25	1.80	22.0	1.50	7.5	1.51	7.9	1.70	13.0*b*
26	1.72	17 9	1.50	7.5	1.55	9.5	1.87	12.0
27	1.70	16.8	1.50	7.5	1.59	11.1	1.97	11.0
28	1.66	14 6	1 48	6 8	I.61	12 0	2.00	10.0
29	1.63	13.0	1 48	6 8	1.61	12 0	1.85	9.0
30	1.66	14.6	1.46	6.1	1.57	10 3	1.76	8.0
31	1.66	14 6	1.48	6.8			1.74	7.0*b*

a Gauge Height interpolated.
b Ice conditions Oct. 25 to 31. Discharge interpolated.

Monthly Discharge of Battle Creek at Wilkes' Ranche, for 1913.

(Drainage area 297 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (5 to 30)	111	70	203	0.684	0.66	11,264
May	78	40	59.5	0 200	0 23	3,658
June	41	12	20.8	0.070	0 08	1,238
July	33	11.0	20.8	0.070	0.08	1,279
August	32	6.8	12.8	0.043	0.05	787
September	12.0	3.8	6.53	0.022	0 02	388
October	31	6.4	10.0	0.034	0.04	615
The period					1.16	19,229

GILCHRIST BROTHERS DITCH NEAR KELVINHURST.

This station was established on October 16, 1911, by F. T. Fletcher. It is located on the S.W. ¼ Sec 11, Tp 5, Rge 27, W. 3rd Mer., at the intake to the ditch.

The gauge, which is a plain staff graduated to feet and inches, is nailed to the right side of a flume at a point 45 feet from the intake gate. The zero of the gauge (elev. 96.92) is referred to the top of a post (assumed elev 100.00) at the lower end of the flume.

Discharge measurements are made with a current meter. The initial point for soundings is the right side of the flume at the gauge. Low discharges are measured with a weir below the flume.

Water was diverted for eight days during June after the ditch had been repaired, to inspect the grades, but discharge measurements were not obtained

STIRLING AND NASH DITCH NEAR KELVINHURST.

This station was established on July 11, 1911, by F. M. French. It is located on the S.E. ¼ Sec. 22, Tp. 3, Rge 27, W 3rd Mer., and is about one mile from the headgate of the ditch and 1,000 feet east of Stirling Brothers' house.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post and braced to a small bridge near the centre of the ditch. The zero of the gauge (elev. 94.81) is referred to the top of a stake (assumed elev. 100.00), on the right bank.

The ditch is straight for 1,000 feet above and 600 feet below the gauge. The cross-section is uniform and the bed and banks of the ditch are in good condition at this point.

At ordinary stages, discharge measurements are made with a current meter by wading near the gauge, but during low water a weir is used.

During 1913, the gauge was read by Robert Stirling.

Sufficient discharge measurements have not been made to determine accurately the discharge for 1913. The ditch was in used for 21 days from June 28th to July 19th.

DISCHARGE MEASUREMENTS of Stirling and Nash Ditch near Kelvinhurst, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 17.....	H. D. St. A. Smith.....	9.5	6.61	0.60	1.32	3.97

BATTLE CREEK AT NASH'S RANCHE.

This station was established May 11, 1910, by N. M. Sutherland It is located on the N.E. ¼ Sec. 3, Tp. 3, Rge 27, W. 3rd Mer., and is 270 feet west of E. R. Nash's house. It is about 70 miles by trail from Maple Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to a post sunk in the bed of the stream at the left bank. The zero (elev. 90.23) is referred to a permanent iron bench mark (assumed elev. 100.00) on the left bank, seven feet east of the initial point of soundings, and in the line of the cross-section. The bench mark is also 1903 feet S. 81°., 28 W. from the N. E. cor., Sec. 3, Tp. 3, Rge.27, W. 3rd Mer. It is about eight inches above ground and is protected by a mound of rock.

The stream flows in one channel 45 feet wide at ordinary stages. The channel is straight for 250 feet above and 300 feet below the station. The right bank is solid clay, high and not liable to overflow. The left bank is also of clay, but is low, and liable to overflow during high stages of the stream. The bed of the stream is composed of sand and gravel and may shift in high stages of the stream.

Discharge measurements are made at ordinary stages with a current meter by wading. At high stages the stream cannot be waded and the discharge is computed from slope measurements. The initial point for soundings is the face of a five inch post on the left bank, 27 feet upstream from the gauge and marked "I.P." in red paint.

During 1913, the gauge was read by E. R. Nash.

DISCHARGE MEASUREMENTS of Battle Creek at Nash's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24.....	H. D. St. A. Smith.....	46.0	79.10	1.37	2.10	108.00
May 15..	do	44.9	59.80	1.20	1.53	74.00
June 17.....	do	10.0	3.00	0.52	0.38	1.55
July 14.....	do	30.0	16.80	0.93	0.65	15.60
Aug. 9.....	do	25.5	12.60	0.55	0.51	5.80
Sept. 17.....	do	18.0	5.15	0.25	0.36	1.27
Oct. 9	do	26.0	10.50	0.69	0.58	7.20
Nov. 1..	do	29.0	20.00	0 79	0.87	15.70

Daily Gauge Height and Discharge of Battle Creek at Nash's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.94	418	1 63	75	0 83	23.00
2	3.89	408	1 65	77	0 83	23.00
3	3 69	368	1.41	59	0 81	22.00
4	3.84	398	1 45	62	0.73	18.00
5	3.34	298	1.54	68	0.73	18.00
6	3.29	288	1.47	63	0.63	13.00
7	3.70	370	1 44	61	0.54	8.60
8	3.61	352	1 20	44	0.43	4.00
9	4.12	460	1.18	43	0 30	0.40
10	6.12	1,027	1.27	49	0 28	0.24
11	4.89	652	1 25	48	0.31	0.42
12	3.68	366	1.23	46	0.28	0.29
13	3.54	338	1 20	44	0.31	0.42
14	4.34	515	1 63	75	0.28	0.24
15	5.66	868	1.55	69	0.28	0.24
16	5.74	894	1.43	60	0 27	0.16
17	3.73	376	1.53	67	0.33	0.76
18	3.29	288	1.48	64	0.32	0.64
19	3.09	248	1.33	53	0.31	0.42
20	2.51	165	1.58	71	0.57	10.00
21	2.55	170	1.43	60	0.97	31.00
22	2.51	165	1.45	62	0.62	12.50
23	2.29	139	1.35	54	0.57	10.00
24	2.10	118	1.32	52	0.67	15.00
25	2.00	108	1 28	50	0.69	16.00
26	1.78	88	1.23	46	0.89	26.00
27	1.65	77	1.25	48	1.07	37.00
28	1.65	77	1.23	46	1.05	36.00
29	1.44	61	1.13	40	0.99	32.00
30	1.60	73	0.98	31	0.95	30.00
31	.....	.....	0.93	28	.....	.....

Daily Gauge Height and Discharge of Battle Creek at Nash's Ranche, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.97	31.0	0.58	10.50	0.48	6.00	0.65	14.0
2	0.87	25.0	0.58	10.50	0.47	5.60	0.65	14.0
3	0 90	26.0	0.46	5.20	0.49	6.40	0.60	11.5
4	0 97	31.0	0.48	6.00	0.47	5.60	0.62	12.5
5	0.95	30.0	0.39	2.40	0.47	5.60	0.66	14.5
6	1.09	38.0	0.36	1.35	0.45	4.80	0.60	11.5
7	1.07	37.0	0.37	1.70	0.42	3.60	0.57	10.0
8	0 97	31.0	0.46	5.20	0.41	3.20	0.57	10.0
9	0.95	30.0	0.47	5.60	0.42	3.60	0.53	8.1
10	0.86	24.0	0.59	11.00	0.41	3.20	0.57	10.0
11	0 87	25.0	0.62	12.50	0.40	2.80	0.62	12.5
12	0.76	19.5	0.56	9.50	0.38	2.00	0.67	15.0
13	0 71	17.0	0.52	7.60	0.37	1.70	0.57	10.0
14	0.75	19.0	0.52	7.60	0.37	1.70	0.62	12.5
15	0.57	10.0	0.55	9.00	0.37	1.70	0.57	10.0
16	0.47	5.6	0.57	10.00	0.36	1.35	0.59	11.0
17	0.57	10.0	0.61	12.00	0.37	1.70	0 61	12.0
18	0.58	10.5	0.57	10 00	0.36	1.35	0.57	10.0
19	0.76	19.5	0.58	10.50	0.37	1.70	0 58	10.5
20	0.66	14.5	0.70	16.50	0.37	1.70	0.57	10.0
21	0.67	15.0	0.76	19.50	0.37	1.70	0.69	16.0
22	0.82	22.0	0.75	19.00	0.38	2.00	0.57	10.0
23	0.81	22.0	0.67	15.00	0.47	5.60	0.57	10.0
24	0.67	15.0	0.66	14.50	0.50	6.80	0.62	12.5
25	0.67	15.0	0.67	15.00	0.52	7.20	0.59	11.0
26	0.72	17.5	0.55	9.00	0.57	10.00	0 67	15.0
27	0.97	31.0	0.56	9.50	0.58	10.50	0 59	11.0
28	0.76	19.5	0.54	8.60	0.55	9.00	0 78	20.0
29	0.66	14.5	0.49	6.40	0.67	15.00	0 82	22.0
30	0.76	19.5	0.47	5.60	0.66	14.50	0 68	15.5
31	0.62	12.5	0.47	5.60	.....	.....	0.60	11.5

Monthly Discharge of Battle Creek at Nash's Ranche, for 1913.

(Drainage area 500 square miles).

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	1,027	61	339	0.678	0.76	20,178
May	77	28	55.3	0.111	0.13	3,401
June	37	0.16	13.0	0.026	0.03	772
July	38	5.6	21.2	0.042	0.05	1,304
August	19.5	1.35	9.43	0.019	0.02	580
September	15.0	1.35	4.93	0.010	0.01	293
October	22	8.1	12.4	0.025	0.03	762
The period					1.03	27,290

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Battle Creek drainage basin, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per sec.*	*Sec.-ft.*
June 9	H. O. Brown	Battle Creek	N.W. 31-7-29-3	22.0	14.8	1.16	17.1
" 9	do	do	S.W. 9-7-29-3	17 3	14 9	1.39	21.0
" 13	do	do	S.E. 21-6-29-3	15.6	14 2	1 60	23.0
" 2	do	Branch of do.	N.W. 29-7-29-3			*a*	0.34
" 3	do	Fourmile Coulee	S.E. 11-8-29-3			*a*	3.22
" 10	do	do	do			*a*	2.16
" 17	do	do	do			*a*	1.73
" 2	H.R.Carscallen	Mink Creek	S.E. 31-7-29-3			*a*	0.63
" 9	H. O. Brown	do	S.E. 21-7-29-3			*a*	0.47
June 4	do	Sixmile Coulee	S.W. 6-7-28-31	4.3	2.34	0.68	1.59
" 10	do	do	do			*a*	0.22
" 3	do	Spring Creek	N.E. 21-7-29-3			*a*	0.28
" 9	do	do	do			*a*	0.29
" 8	do	do	S.E. 11-8-29-3			*a*	0.13
" 4	do	do	S.W. 3-7-29-3			*a*	0.23
May 31	do	Whitemud Coulee	S.W. 26-7-29-3			*a*	0.18
June 2	H.R.Carscallen	do	do			*a*	0.16
" 2	do	do	do			*a*	0.75
" 11	H. O. Brown	do	do			*a*	0.08
" 17	do	do	do			*a*	1.73

a Weir measurement.

FRENCHMAN RIVER DRAINAGE BASIN.

General Description.

Frenchman River drains the greater portion of southwestern Saskatchewan. It rises in Cypress Lake in Tp. 6, Rge. 26, W. 3rd Mer., and follows a southeasterly course for about 150 miles, crossing into the United States in Range 10, West of the Third Meridian. It eventually finds its way into Milk River near Saco, Montana, and therefore forms a part of the general drainage basin of the Missouri.

Cypress Lake is on the southern slope of Cypress Hills at an elevation of about 3155 feet above sea level. It occupies what is probably a portion of an abandoned water course or channel of an ancient river, which joined Battle Creek to the Frenchman River. The water of the lake is fresh and is supplied by a number of coulees and small streams which rise in the hills to the north. The largest of these are Oxarart and Sucker Creeks, both of which have a small continuous flow.

During dry years Cypress Lake does not overflow and the whole discharge of the Frenchman River is derived from Belanger, Davis and Fairwell Creeks and the north branch. From Township 6, Range 23, West of the Third Meridian, where the north branch joins the main stream, there is no appreciable supply to the river while in Canada. Mule Creek which joins the river in Township 5, Range 17, West of the Third Meridian, and Snake Creek in Township 3, Range 13, West of the Third Meridian, however, have a small flow.

The country surrounding Cypress Lake is of rolling prairie much broken by coulees. In many of these there is considerable tree growth but for the most part the country is devoid of all vegetation other than grasses. All the streams in the upper section of the drainage basin, with the exception of the north branch, rise on the plateau at the top of the hills. Flowing southward they break through deep well wooded gorges before reaching the lower flats along the river. The north branch, however, is in a deep valley throughout its entire length. Its feeders, like the western tributaries of the main stream, cut through from the bench to the valley in deep well wooded coulees. Below the mouth of the north branch there is little tree growth. Here and there along the river may be found small growths of shrubs and maple while up on the hillsides in some of the coulees there are small clumps of poplar covering an acre or so. Most of these coulees are rapidly becoming cleared by the settlers who are taking up the bench lands above the river valley. The benches are well covered with grasses but the hills and sides of the valley are almost devoid of vegetation. In the flats along the river, except where irrigated, the chief vegetation consists of sage-brush and cactus.

When the Frenchman River leaves the lake, it flows through a wide flat valley as far as mouth of Fairwell Creek. Most of this land is under proposed or constructed irrigation ditches, the covering an area of about 393 acres. Below this point the valley becomes more broken and narrows considerably while the side hills become higher. Small portions of this bottom will no doubt be brought under irrigation, but as yet little has been done in that direction.

Below the junction of the north branch the valley becomes rough and rugged, the sides being cut with buttes and deep coulees. Here numerous outcroppings of lignite may be seen and also a deep seam of light colored clay and sand. This seam, which has been bleached

almost a pure white shows at many points along the river's entire course and is one of the most conspicuous objects in this region. From its color and nature the river receives its local name of the "Whitemud".

At East End, some miles lower down, the valley again widens out into flats. Here is located the largest irrigation project in the Cypress Hills district. Messrs. Strong and Day have a large dam in the river and a system of ditches and storage reservoirs, by which they irrigate 2,581 acres. Directly above this project there are two smaller schemes covering 200 acres. Just below, Messrs. Morrison Brothers have a dam and ditch which will irrigate 1,595 acres. Their ditch is carried across the river and continued by Messrs. Duncan and Watson who irrigate 935 acres more.

Below the East End flat none of the flats, which occur at various points along the river, are irrigated as yet. A short distance below the mouth of Snake Creek, the river enters badlands which continue into the United States.

The mean annual rainfall of this basin is not well established, but it is estimated that it would range from 12 to 16 inches, most of which falls in May, June and July. From November to April, the streams are frozen over and usually there is an abundant snowfall.

OXARART CREEK AT WYLIE'S RANCHE.

This station was established June 15, 1909 by H. R. Carscallen. It is located on the N.E ¼, Sec. 20, Tp. 6, Rge. 27, W. 3rd Mer., three miles above the point where the creek flows into Cypress Lake, and thirty-five miles south of Maple Creek. It is above the intake of Joseph Wylie's irrigation ditch.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to a braced post sunk in the bed of the stream at the left bank. The zero of the gauge (elev. 3199.03) is referred to a permanent iron bench mark (elev. 3203.75 above mean sea level irrigation surveys), situated on the right bank, four feet from the final point stake and in line with the cross section.

The channel is straight for ten feet upstream, at which point four small courses converge. It is straight for twenty feet downstream and then is turned almost at right angles by Mr. Wylie's dam. Both banks are low and sodded and are liable to overflow at very high stages. The bed is coarse gravel and shifts during floods. During high stages the creek has several channels. On account of the porous gravel bed there is considerable seepage near the gauge.

Discharge measurements are made during high stages at the gauge with a current meter by wading. The initial point for soundings is a square stake, driven close to the ground on the left bank and marked "I.P.". During ordinary stages measurements are made seventy five feet downstream from the gauge, where the current is swift.

During 1913, the gauge was read by Mrs. Rachel Wylie.

DISCHARGE MEASUREMENTS of Oxarart Creek at Wylie's Ranche, in 1913.

Date.	Hydrographer	Width.	Area of Cection.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 16	H. D. ST. A. Smith	39.0	18.20	1.93	1.54	35.20
April 25	do	7.0	3.61	1.16	1.03	4.20
May 17	do	6.0	3.36	0.98	0.83	3.19
June 19	do	6.0	2.75	0.56	0.70	2.75
July 15	do	5.0	3.38	0.39	0.61	1.31
Aug. 11	do	5.0	2.05	0.50	0.62	1.25
Sept. 15	do	3.5	1.08	0.70	0.63	0.76
Oct. 8	do	3.5	0.93	0.73	0.64	0.68
Oct. 31	do	4.0	1.00	0.78	0.63	0.78

Daily Gauge-height and Discharge of Oxarart Creek at Wylie's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	[a]	50.0	1.05	5.4	0.83	4.1
2	[a]	50.0	1.05	5.6	0.83	4.2
3	[a]	45.0	1.00	4.6	0.83	4.2
4	1.70	44.0	1.10	7.2	0.83	4.3
5	[a]	44.0	1.10	7.5	0.83	4.4
6	[a]	40.0	1.09	7.4	0.83	4.5
7	[a]	40.0	1.00	5.4	0.83	4.6
8	[a]	40.0	0.98	5.2	0.83	4.6
9	[a]	35.0	0.98	5.4	0.83	4.7
10	[a]	35.0	0.95	4.5	0.83	4.7
11	1.50	32.0	0.95	4.8	0.83	4.8
12	[a]	30.0	0.90	4.0	0.83	4.9
13	[a]	30.0	0.90	4.1	0.83	4.9
14	[a]	35.0	0.88	3.9	0.83	5.0
15	[a]	35.0	0.85	3.6	0.83	5.0
16	1.54	34.0	0.83	3.1	0.83	5.1
17	1.48	31.0	0.85	3.5	0.83	5.2
18	1.42	28.0	0.85	3.6	0.83	5.3
19	1.35	24.0	0.85	3.7	0.83	5.4
20	1.35	24.0	0.85	3.8	0.73	3.2
21	1.20	16.6	0.85	3.9	0.79	4.4
22	1.20	14.5	0.85	3.9	0.79	4.4
23	1.20	13.2	0.85	4.0	0.79	4.4
24	1.20	11.5	0.85	4.0	0.79	4.4
25	1.20	8.4	0.85	4.1	0.79	4.4
26	1.20	8.6	0.85	4.1	0.79	4.4
27	1.15	7.3	0.85	4.2	0.79	4.4
28	1.12	6.5	0.85	4.2	0.79	4.4
29	1.07	5.6	0.84	4.2	0.79	4.4
30	1.05	5.3	0.84	4.2	0.79	4.4
31	.....	.....	0.83	4.1	.....	.....

[a] No observations of gauge heights. Discharge is estimated from run-off of streams in this locality.

Daily Gauge-height and Discharge of Oxarart Creek at Wylie's Ranche, for 1913.
Concluded.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.79	4.30	0.63	1.42	0.61	0.83	0 63	0.65
2	0.78	4.00	0.63	1.42	0.61	0.82	0.64	0.74
3	0.76	3.70	0.63	1.41	0.61	0.80	0.64	0.73
4	0.76	3.70	0.63	1.41	0.61	0.79	0.64	0.72
5	0.77	3.80	0.63	1.40	0.61	0.78	0.64	0.72
6	0.75	3.50	0.63	1.40	0.61	0.76	0.64	0.71
7	0.70	2.60	0.63	1.39	0.61	0.74	0.64	0.71
8	0.70	2.60	0.63	1.39	0.61	0.73	0.64	0.70
9	0.68	2.20	0.63	1.38	0.61	0.71	0.64	0.69
10	0.65	1.80	0.63	1.37	0.61	0.70	0.64	0.69
11	0.65	1.80	0.61	1.15	0.61	0.69	0.64	0.70
12	0.63	1.60	0.61	1.14	0.61	0.68	0.64	0.70
13	0.63	1.60	0.61	1.12	0.61	0.66	0.64	0.71
14	0.63	1.50	0.61	1.11	0.61	0.65	0.64	0.72
15	0.63	1.50	0.61	1.08	0.61	0.64	0.64	0.73
16	0.63	1.50	0.61	1.07	0.63	0.74	0.64	0.75
17	0.63	1.50	0.61	1.06	0.63	0.74	0.64	0.76
18	0.63	1.49	0.61	1.04	0.63	0.73	0.64	0.76
19	0.63	1.49	0.61	1.02	0.63	0.74	0.63	0.77
20	0.63	1.49	0.61	1.01	0.63	0.72	0.64	0.78
21	0.63	1.48	0.61	1.00	0.63	0.72	0.64	0.79
22	0.63	1.48	0.61	0.99	0.63	0.71	0.64	0.79
23	0.63	1.48	0.61	0.98	0.63	0.71	0.64	0.80
24	0.63	1.47	0.61	0.96	0.63	0.70	0.64	0.81
25	0.63	1.46	0.61	0.94	0.63	0.70	0.64	0.82
26	0.63	1.46	0.61	0.92	0.63	0.69	0.64	0.83
27	0.63	1.46	0.61	0.90	0.63	0.69	0.64	0.84
28	0.63	1.44	0.61	0.89	0.63	0.69	0.64	0.85
29	0.63	1.44	0.61	0.88	0.63	0.68	0.64	0.86
30	0.63	1.44	0.61	0.86	0.63	0.68	0.64	0.87
31	0.63	1.43	0.61	0.85	.....	.....	0.64	0.87

Monthly Discharge of Oxarart Creek at Wylie's Ranche, for 1913.

(Drainage area 73 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	50.00	5.30	27.480	0.376	0.42	1,636
May	7.50	3.10	4.550	0.062	0.07	280
June	5.40	3.20	4.570	0.063	0.07	272
July	4.30	1.43	2.060	0.028	0.03	127
August	1.42	0.85	1.130	0.015	0.02	69
September	0.83	0.68	0.721	0.010	0.01	43
October	0.87	0.65	0.760	0.010	0.01	47
The period					0.63	2,474

SUCKER CREEK AT WHITCOMB AND ZEIGLER'S RANCHE.

This station was established May 26, 1909, by H. R. Carscallen. It is located on the N.W. ¼ Sec. 24, Tp. 6, Rge. 26, W. 3rd Mer., about five miles south of Belanger post office and about thirty-two miles south of Maple Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to a vertical post sunk in the bed of the stream and securely stayed to the left bank. The zero of the gauge (elev. 3191.11) is referred to a permanent iron bench mark (elev. 3196.25 feet above

mean sea level, Irrigation Surveys,) located 60′ S.W. of the rod, which is 590 ft. N. 69°E.. of the N.E. corner Sec. 23, Tp. 6, Rge. 26, W. 3rd Mer.

The channel is straight for 50 feet above and 25 feet below the station. Both banks are low, sparsely covered with brush, and will overflow at high stages. The bed of the stream is composed of sand and coarse gravel. The current is sluggish at the station but swift immediately below.

Discharge measurements are made with a meter at or near the gauge by wading and at very low stages a weir is used. It is difficult to make accurate gaugings during high water, as the water overflows the banks.

During 1913, the gauge was read by Mrs. P. A. Zeigler.

DISCHARGE MEASUREMENTS of Sucker Creek at Whitcomb and Zeigler's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 16	J. S. Wright & E. W. W. Hughes.	32.0	25.0	1.55	1.55	39.00
May 20	E. W. W. Hughes	16.0	10.6	0.61	1.01	6.50
June 23	do	14.5	4.2	0.66	0.78	2.80
June 26	do	24.5	7.8	0.47	0.84	3.70
July 26	do	18.0	6.7	0.18	0.65	1.22
Sept. 2	do	13.0	3.2	0.52	0.76	1.70
Sept. 29	do	13.0	3.7	0.67	0.81	2.50
Oct. 20	do	14.0	3.7	0.53	0.83	1.98
Nov. 13	do	10.0	3.3	0.68	0.82	2.20

DAILY GAUGE-HEIGHT AND DISCHARGE of Sucker Creek at Whitcomb and Zeigler's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.00	92.0	1.05	7.60	0.78	2.80
2	1.80	68.0	1.13	10.00	0.75	2.40
3	1.60	44.0	1.13	10.00	0.75	2.40
4	1.77	64.0	1.10	9.00	0.75	2.40
5	2.18	113.0	1.00	6.30	0.75	2.40
6	2.62	166.0	1.05	7.60	0.73	2.20
7	2.52	154.0	1.03	7.10	0.71	1.92
8	2.22	117.0	1.05	7.60	0.70	1.80
9	2.00	92.0	1.05	7.60	0.70	1.80
10	1.78	65.0	1.07	8.20	0.70	1.80
11	1.68	53.0	1.05	7.60	0.70	1.80
12	2.00	92.0	1.03	7.10	0.71	1.92
13	2.05	98.0	1.03	7.10	0.81	3.20
14	2.08	101.0	1.25	14.80	0.82	3.40
15	1.82	70.0	1.20	12.50	0.69*a*	1.68
16	1.52	35.0	1.17	11.40	0.69	1.68
17	1.38	22.0	1.15	10.60	0.72	2.00
18	1.28	16.4	1.11	9.30	0.75	2.40
19	1.28	16.4	1.07	8.20	0.76	2.60
20	1.21	13.0	1.00	6.30	1.05	7.60
21	1.19	12.1	0.98	5.90	0.85	3.80
22	1.14	10.3	0.98	5.90	0 88	4.30
23	1.10	9.0	0.98	5.90	0.75	2.40
24	1.05	7 6	0.96	5.60	0.85	3.80
25	1.03	7.1	0.94	5.20	0.87	4.10
26	1.03	7.1	0.92	4.90	0.87	4.10
27	1.03	7 1	0 90	4.60	0.82	3.40
28	1.04	7.3	0.90	4.60	0.76	2.60
29	1.05	7.6	0.90	4.60	0.75	2.40
30	1.05	7.6	0.80	3.10	0.70*a*	1.80
31			0.81	3.20		

a Between June 15th and 30th a small ditch running approximately *a* 30 sec ft. was taken out above gauge rod

DAILY GAUGE-HEIGHT AND DISCHARGE of Sucker Creek at Whitcomb and Zeigler's Ranche, for 1913.—*Concluded.*

DAY	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.73	2.20	0.64	1.00	0.75	1.60	0.80	2.20
2	.75	2.40	.60	0.55	.76	1.70	.80	2.20
3	.75	2.40	.60	.52	.73	1.29	.80	2.20
4	.95	5.40	.60	0.50	.68	0.64	.80	2.10
5	.80	3.10	.65	1.02	.65	.25	.81	2.20
6	.75	2.40	.65	1.00	.66	.38	.85	2.80
7	.70	1.80	.67	1.20	.67	.51	.83	2.40
8	.68	1.56	.70	1.52	.67	.51	.83	2.40
9	.65	1.21	.75	2.10	.68	.64	.83	2.40
10	.68	1.56	.75	2.10	.70	0.90	.83	2.30
11	.75	2.40	.75	2.00	.71	1.03	.82	2.10
12	.75	2.40	.70	1.42	.71	1.03	.82	2.10
13	.85	3.80	.70	1.43	.71	1.03	.82	2.10
14	.75	2.40	.80	2.60	.72	1.16	.82	2.00
15	.70	1.80	.75	1.98	.74	1.42	.84	2.30
16	.70	1.80	.75	2.00	.75	1.56	.84	2.30
17	.68	1.56	.76	2.00	.75	1.56	.84	2.20
18	.65	1.21	.80	2.60	.75	1.56	.84	2.20
19	.65	1.21	.78	2.20	.76	1.70	.84	2.10
20	.65	1.21	.75	1.90	.77	1.85	.84	2.10
21	.60	0.66	.70	1.20	.78	2.00	.84	2.10
22	.75	2.40	.71	1.22	.83	2.80	.83	2.00
23	.70	1.80	.70	1.12	.85	3.10	.83	2.00
24	.65	1.21	.65	0.50	.84	2.00	.83	2.10
25	.65	1.21	.65	0.48	.83	2.80	.83	2.10
26	.65	1.21	.67	0.70	.80	2.30	.83	2.20
27	.66	1.23	.67	0.65	.80	2.30	.83	2.20
28	.68	1.58	.66	0.50	.80	2.30	.82	2.10
29	.65	1.17	.67	0.58	.79	2.20	.83	2.20
30	.66	1.25	.70	1.98	0.79	2.10	.83	2.30
31	0.65	1.09	0.76	1.75	.....	.....	0.84	2.40

MONTHLY DISCHARGE of Sucker Creek at Whitcomb and Zeigler's Ranche, for 1913.

(Drainage area 33 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	166.0	7.10	52.50	1.590	1.770	3,124
May	14.8	3.10	7.40	0.224	0.258	455
June	7.6	1.68	2.76	0.084	0.090	164
July	5.4	0.66	1.89	0.057	0.065	116
August	2.6	0.48	1.36	0.041	0.046	84
September	3.1	0.25	1.57	0.048	0.054	93
October	2.8	2.00	2.21	0.067	0.077	136
The period	.....	.....	.....	.....	2.360	4,172

LONEPINE CREEK AT HEWITT'S RANCHE.

This station was established July 17, 1909, by H. R. Carscallen. It is located on the N.W. ¼ Sec. 27, Tp. 7, Rge. 26, W. of 3rd Mer., about two miles west of the surveyed trail from Belanger post office to Maple Creek, and about four miles west of Belanger.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a post sunk in the bed of the stream at the right bank and securely stayed in place. The zero of the gauge (elev. 93.35) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank fifty feet west of the gauge.

The channel is straight for about 35 feet above and 45 foot below the station. The right bank is high and not liable to overflow; the left is comparatively low and will overflow at high stages of the stream. The surface of the ground on the left bank is very rough and broken. The bed of the stream is composed of sand and coarse gravel. The current is smooth and swift.

On June 27, 1913, a permanent 15″ weir was placed on this creek along with a gauge, which was read during the remainder of the season. The elevation of the crest of the weir and zero of the gauge rod is 96.34, referred to the permanent iron bench mark at the old station.

During 1913, the gauge was read by S. W. Hewitt.

This station is below ditches constructed by A. P. McDonald and S. W. Hewitt and in the case of water being used in these ditches the records at the gauge do not give the complete discharge of the creek.

DISCHARGE MEASUREMENTS of Lonepine Creek at Hewitt's Ranche, in 1913.

Date.	Hudrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 15	J. S. Wright & E. W. W. Hughes.	5.4	7.0	0.89	2.55	6.10
May 21	E. W. W. Hughes	4.7	3.5	0.59	2.07	2.10
June 28	do	.....	.....	.....	1.52	*b* 0.95
July 26	do	.....	.....	.....	1.48	*b* 0.78
Sept. 4	do	.....	.....	.....	*a* 0.17	*b* 0.28
Sept. 29	do	.....	.....	.....	*a* 0.34	*b* 0.79
Nov. 14	do	.....	.....	.....	*a* 0.22	*b* 0.75

a Permanent weir gauge heights.
b Weir measurements.

DAILY GAUGE-HEIGHT AND DISCHARGE of Lonepine Creek at Hewitt's Ranche, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	....*a*	.....	2.03*b*	1.96	1.79	1.34
2	.....	.....	2.03*b*	1.96	1.79	1.34
3	.....	.....	2.03*b*	1.96	1.79*b*	1.34
4	.....	.....	2.04	1.99	1.79	1.34
5	....*a*	.....	2.04*b*	1.99	1.66*b*	1.11
6	2.21	2.70	2.04*b*	1.99	1.53*b*	0.92
7	2.54*b*	5.20	2.04	1.99	1.45*b*	0.82
8	2.86	13.20	2.09	2.20	1.38	0.73
9	2.91	14.40	2.09*b*	2.20	1.38	0.73
10	2.56	6.30	2.09*b*	2.20	1.38	0.73
11	2.86	13.20	2.08*b*	2.10	1.38*b*	0.73
12	2.87	13.50	2.08	2.10	1.38*b*	0.73
13	2.51	5.20	2.15*b*	2.40	1.38*b*	0.73
14	2.66	8.60	2.15*b*	2.40	1.38*b*	0.73
15	2.55	6.00	2.23	2.80	1.38*b*	0.73
16	2.35	3.40	2.33	3.30	1.38*b*	0.73
17	2.35	3.40	2.22	2.70	1.38	0.73
18	2.35	3.40	2.12	2.30	1.36	0.71
19	2.26	2.90	2.09*b*	2.20	1.36	0.71
20	2.16	2.40	2.06*b*	2.10	1.44*b*	0.82
21	2.11*b*	2.20	2.02	1.93	1.53*b*	0.92
22	2.06	2.10	2.01	1.90	1.61	1.04
23	2.05	2.00	1.95*b*	1.73	1.66	1.11
24	1.96	1.76	1.89*b*	1.57	1.86	1.50
25	1.96	1.76	1.84*b*	1.44	1.82*b*	1.40
26	1.91	1.63	1.81	1.38	1.78*b*	1.32
27	2.01	1.90	1.81	1.38	1.72*b*	1.21
28	2.01	1.90	1.81*b*	1.38	1.69	1.15
29	2.06	2.10	1.80*b*	1.36	1.69*b*	1.15
30	2.03	1.96	1.79*b*	1.34	1.69*b*	1.15
31	.....	.....	1.79	1.34	.....	.....

a Ice in creek; no gauge heights recorded until April 6th.
b Gauge height interpolated.

DAILY GAUGE-HEIGHT AND DISCHARGE of Lonepine Creek, at Hewitt's Ranche, for 1913.
Concluded.

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	a .35	0.82	.32	0.71	.22	0.40	b .35	0.82
2	.50	1.35	b .26	.52	.22	.40	b .36	.85
3	b .50	1.35	.20	.35	b .20	.35	b .37	.89
4	b .49	1.31	b 29	.61	.17	.28	b .38	.92
5	.49	1.31	.39	.96	b .16	.25	.39	.96
6	b 44	1.31	.35	.82	b .16	.25	.39	.96
7	b .39	0.96	b .35	.82	.15	.23	.39	.96
8	b .34	.78	b .35	.82	.16	.25	b .39	.96
9	.30	.64	b .35	.82	.19	.33	b .39	.96
10	b .35	0.82	.35	.82	b .20	.35	b .39	96
11	.70	2.40	.33	.75	b .22	.40	b .39	.96
12	b .55	1.56	.33	.75	b 24	.46	.39	.96
13	.41	1.03	b .34	.78	b .26	.52	.39	.96
14	b .40	0.99	b .35	.82	b 28	.58	.39	.96
15	.39	.96	b 36	.85	b .30	.64	b .39	.96
16	.39	.96	b .37	.89	b .32	.71	b .39	.96
17	b .39	.96	b .38	.92	b .34	.78	b .39	.96
18	b .39	.96	.39	.96	.35	.82	b .39	.96
19	b .39	.96	.35	.82	.34	.78	.40	.99
20	39	0.96	.35	.82	.30	.64	.39	.96
21	b .44	1.13	b .31	.68	.25	.49	.39	.96
22	.48	1.27	b .27	.55	b .30	0.64	b .39	.96
23	b .45	1.17	b .23	.43	.64	1.96	b .40	0.99
24	b .42	1.06	.21	.38	b .55	1.56	b .41	1.03
25	b .39	0.96	.20	.35	b .45	1.17	b .42	1.06
26	.34	.78	.20	.35	.35	0.82	.43	1.10
27	b .36	.85	b .20	.35	b .34	.78	.43	1.10
28	.39	.96	b .20	.35	.34	.78	.43	1.10
29	.38	.92	b .21	.38	.34	.78	b .42	1.06
30	b .35	.82	b .21	.38	.34	0.78	b .41	1.03
31	.32	0.71	.22	0.40	.....	.....	b .40	0.99

a Gauge heights read on permanent weir from July 1st to October 31st.
b Gauge height interpolated.

MONTHLY DISCHARGE of Lonepine Creek at Hewitt's Ranche, for 1913.

(Drainage area 8 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (6-30)	10.40	1.63	6.720	.840	.781	413
May	3.30	1.34	1.990	.248	.286	122
June	1.50	0.71	0.990	.123	.137	59
July	2.40	.64	1.060	.132	.152	65
August	0.96	.35	0.652	.082	.094	40
September	1.96	.23	0.639	.080	.089	38
October	1.10	0.82	0.976	.122	.141	60
The period	.....	.....	.....	.....	1.680	797

BELANGER CREEK AT GARRISON'S RANCHE.

This station was established June 12, 1909, by H. R. Carscallen. It is located on the S.W. ¼ Sec. 18, Tp. 7, Rge. 25, W. 3rd Mer., one hundred and fifty yards west of Garrison's ranche (Belanger P.O.), and about twenty seven miles south of Maple Creek.

This station was abandoned in June 1913 on account of the difficulty of securing a reliable observer. The station at Oakes' ranche 5½ miles downstream is maintained instead.

DISCHARGE MEASUREMENTS of Belanger Creek at Garrison's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-Feet.*
April 16	J. S. Wright & E. W. W. Hughes.	24.7	21.5	1.58	2.26	34.0
May 21	E. W. W. Hughes	12.3	10.6	0.80	1.91	8.5
June 28	do	13.4	8.4	0.58	2.01	4.8

a This measurement was made ¼ mile upstream from old station after gauge rod was moved to new station.

BELANGER CREEK AT OAKES' RANCHE.

This station was established on March 31, 1912, by M. H. French. It is located on the S.W. ¼ Sec. 30 Tp. 6, Rge. 25, W. 3rd Mer., at Oakes' ranche and about 35 miles south of the town of Maple Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to a vertical post sunk in the bed of the stream and securely stayed to the left bank. The zero of the gauge (3164.10) is referred to a permanent iron bench mark (elev. 3168.57 feet above mean sea level, Irrigation Surveys) and located 80′ S.W. of the rod.

The channel is straight for about 50 feet above and below the gauge. The left bank is heavily wooded. Both banks are low and liable to overflow during floods. The bed of the stream is composed of sand and gravel and is liable to shift.

Discharge measurements are made by wading at a graded cross section about 25′ above the gauge; the initial point for soundings is a willow stake, driven in the right bank and marked "I.P".

During 1913 the gauge was read by E. C. R. Harris.

Practically no water was diverted from this creek during 1913.

DISCHARGE MEASUREMENTS of Belanger Creek at Oakes' Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-Feet.*
April 16	J. S. Wright and E. W.W. Hughes	11.4	14.7	2.82	0.98	42.0
May 20	E. W. W. Hughes	18.6	7.9	1.39	.41	11.1
June 23	do	18.7	6.8	0.98	.31	6.7
June 26	do	22.7	10.6	.52	.42	8.4
June 26	do	13.2	9.4	.85	.43	a 7.9
July 26	do	21.3	7.0	.48	.23	3.4
Sept. 2	do	21.5	8.2	.38	.24	3.1
Sept. 29	do	22.0	8.2	.47	.27	3.8
Oct. 30	do	22.0	7.8	.39	.23	3.0
Nov. 13	do	22.0	8.2	0.35	0.22	2.9

a This measurement was taken ¼ mile downstream from regular station.

Daily Gauge-height and Discharge of Belanger Creek, at Oakes' Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Fee	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.03*a*	173.0	0.38*b*	9.7	0.35	8.3
2	2.98	170.0	0.36	8.8	0.34	7.8
3	2.92	166.0	0.35*b*	8.3	0.34	7.8
4	2.97	169.0	0.34*b*	7.8	0.33	7.4
5	2.56	143.0	0.34	7.8	0.33	7.4
6	2.56*b*	143.0	0.35*b*	8.3	0.33*b*	7.4
7	2.55*b*	142.0	0.35	8.3	0.32*b*	6.9
8	2.55	142.0	0.36*b*	8.8	0.31	6.5
9	2.35	127.0	0.37	9.2	0.30*b*	6.0
10	2.16*b*	117.0	0.37*b*	9.2	0.29	5.6
11	1.97*b*	105.0	0.37	9.2	0.30*b*	6.0
12	1.78*b*	93.0	0.38*b*	9.7	0.32*b*	6.9
13	1.59*b*	81.0	0.38	9.7	0.33	7.4
14	1.40*b*	68.0	0.45*b*	12.9	0.32*b*	6.9
15	1.20*b*	56.0	0.51	15.7	0.32	6.9
16	0.99	42.0	0.48*b*	14.3	0.32*b*	6.9
17	0.93*b*	38.0	0 45	12.9	0.32	6.9
18	0.87*b*	35.0	0.44*b*	12.4	0.33	7.4
19	0.81	31.0	0.42*b*	11.5	0.30	6.0
20	0.75	28.0	0.41	11.1	0.31*b*	6.5
21	0.69*b*	25.0	0.40*b*	10.6	0.32*b*	6.9
22	0.63*b*	22.0	0.39*b*	10.1	0.33*b*	7.4
23	0.57*b*	18.6	0.38	9.7	0.33	7.4
24	0.50	15.2	0.38*b*	9.7	0.36*b*	8.8
25	0.44*b*	12.4	0.37	9.2	0.39*b*	10.1
26	0.38*b*	9.7	0.35	8.3	0.41	11.1
27	0.32*b*	6.9	0.35*b*	8.3	0.39*b*	7.2
28	0.27	4.7	0.36	8.8	0.37*b*	6.6
29	0.33*b*	7.4	0.38	9.7	0.35	6.0
30	0.39	10.1	0.37*b*	9.2	0.34*b*	5.8
31	.....	.....	0.36*b*	8.8	.....	.....

a Water flowing over ice
b Gauge height interpolated.

Daily Gauge-height and Discharge of Belanger Creek, at Oakes' Ranche, for 1913.
Concluded.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gaug Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.33	5.4	.23	3.0	b .24	3.2	b .25	3.4
2	b .41	7.9	b .23	3.0	.24	3.2	.25	3.4
3	b .49	10.8	.22	2.8	b .23	3.0	b .25	3.4
4	.57	13.7	b .22	2.8	.21	2.6	.25	3.4
5	b .49	10.8	.22	2.8	b .21	b2.6	b .28	4.0
6	b .40	7.6	b .26	3.6	b .20	2.4	.31	4.8
7	.32	5.2	b .30	4.6	.20	2.4	b .29	4.2
8	.27	3.8	.33	5.4	b .21	2.6	b .28	4.0
9	.27	3.8	b .32	5.2	.23	3.0	.26	3.6
10	b .32	5.2	.32	5.2	b .22	2.8	b .25	3.4
11	.38	7.0	b .31	4.8	b .21	2.6	.25	3.4
12	b .41	7.9	.30	4.6	.20	2.4	.25	3.4
13	.45	9.4	b .35	6.1	b .20	2.4	b .25	3.4
14	b .43	8.6	b .40	7.6	b .20	2.4	b .24	3.2
15	b .41	7.9	b .37	6.6	b .20	2.4	.24	3.2
16	b .40	7.6	b .35	6.1	.20	2.4	.24	3.2
17	.38	7.0	.32	5.2	b .20	2.4	b .24	3.2
18	.37	6.6	b .33	5.4	.20	2.4	.25	3.4
19	b .35	6.0	.35	6.1	b .22	2.8	b .25	3.4
20	b .33	5.4	b .33	5.4	.23	3.0	.26	3.6
21	b .30	4.6	.31	4.8	b .24	3.2	.26	3.6
22	.28	4.0	b .29	4.2	b .24	3.2	b .25	3.4
23	b .28	4.0	b .27	3.8	.25	3.4	.24	3.2
24	b .27	3.8	.24	3.2	b .28	4.0	.24	3.2
25	.27	3.8	b .23	3.0	.31	4.8	b .24	3.2
26	.24	3.2	.22	2.8	b .30	4.6	.24	3.2
27	b .24	3.2	b .22	2.8	b .29	4.2	b .23	3.0
28	.24	3.2	.21	2.6	b .28	4.0	.22	2.8
29	.24	3.2	b .22	2.8	.27	3.8	b .22	2.8
30	b .24	3.2	b .23	3.0	b .26	3.6	b .22	2.8
31	b .23	3.0	.24	3.2	.....	.....	b .22	2.8

b Gauge height interpolated.

Monthly Discharge of Belanger Creek at Oakes' Ranche, for 1913.

(Drainage area 64 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	173.0	4.7	73.4	1.150	1.280	4,368
May	15.7	7.8	9.9	0.155	0.179	610
June	11.1	5.6	7.2	.113	.126	429
July	13.7	3.0	6.0	.094	.108	371
August	7.6	2.6	4.3	.067	.077	263
September	4.8	2.4	3.1	.048	.054	182
October	4.8	2.8	3.4	0.053	0.061	208
The period	.....	.....	.....	.....	1.885	6,431

DAVIS CREEK AT DRURY'S RANCHE.

This station was established May 24, 1909, by H. R. Carscallen. It is located on the N.E. ¼ Sec. 29, Tp. 6, Rge. 25, W. 3rd Mer., about five miles southeast of Belanger P.O., and about one-half mile from the mouth of the creek.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to a vertical post sunk in the bed of the stream and securely stayed to the right bank. The zero of the gauge (elev. 3176.79) is referred to a permanent iron bench mark (elev. 3183.06 feet above mean sea level, Irrigation Surveys) located about 25 feet west of the gauge.

The channel is straight for 150 feet above and 200 feet below the station. The right bank is comparatively high and will not overflow except in cases of extreme flood; the left bank is low and will overflow at high-water stages of the stream. Both banks are covered with brush. The bed of the stream is composed of sand and coarse gravel and there may be a slight sub-surface flow at this point. The current is swift.

Discharge measurements are made at or near the gauge by wading. Owing to the left bank being low, high-water measurements cannot be made. Considerable annoyance is experienced by the construction of dams below the gauge by beavers.

During 1913, the gauge was read by E. C. R. Harris.

There are one or two proposed irrigation schemes on the head-waters of this stream, but as yet there has been no diversion of water.

Discharge Measurements of Davis Creek at Drury's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 17	J. S. Wright & E. W. W. Hughes	25.5	35.3	1.38	1.25	48.90
May 19	E. W. W. Hughes	22.7	10.3	0.86	0.69	8.80
June 21	do	5.6	2.6	.99	.46	2.60
Sept. 2	do	4.0	0.8	0.49	0.35	0.41
Oct. 20	do					Nil.
Nov. 13	do					Nil.

Daily Gauge-height and Discharge of Davis Creek, at Drury's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.45*a*	2 2	0.71	9 6	0 54	4.2
2	0.70*a*	9.2	0.74	11.0	0.51	3.4
3	0.88*a*	18.2	0 76	11 9	0.50	3.2
4	1.16	40.0	0.71	9.6	0.50	3 2
5	1.90	114.0	0.70	9.2	0.48	2.8
6	3.35	259 0	0.68	8 5	0.48	2.8
7	2.48	172.0	0 66	7.8	0.48	2.8
8	3.02	226.0	0.70	9.2	0.47	2.6
9	2.43	167.0	0 69	8 8	0.47	2.6
10	2.69	193.0	0.68	8.5	0.47	2.6
11	2.90	214.0	0 68	8.5	0.47	2.6
12	2.65	189.0	0 66	7.8	0.48	2.8
13	2.81	205.0	0 65	7.4	0.47	2.6
14	1.58	82.0	0.74	11.0	0.47	2.6
15	1.57	81.0	0.78	12 8	0.47	2.6
16	1.40	64.0	0 74	11.0	0.48	2.8
17	1.25	49 0	0 70	9.2	0 47	2.6
18	1.17*b*	41.0	0.70	9.2	0.47	2.6
19	1.11	36.0	0.69	8.8	0 47	2.6
20	1.04*b*	30 0	0.68	8.5	0.48	2.8
21	0 97*b*	24.0	0 66	7.8	0 47	2.6
22	0 90	19.4	0.62	6.4	0.47	2.6
23	0.82*b*	14.8	0 62	6 4	0 47	2.6
24	0.74	11 0	0 60	5.8	0.48	2.8
25	0.70	9 2	0.58	5.2	0.48	2.8
26	0 68	8 5	0.56	4.7	0.48	2.8
27	0 72	10.1	0 56	4.7	0.47	2.6
28	0.76	11 9	0 54	4 2	0.46	2.4
29	0 76	11 9	0 56	4 7	0.46	2.4
30	0 75	11 4	0.56	4 7	0 46	2.4
31			0 54	4.2		

a Ice in creek; discharge estimated.
b Gauge height interpolated.

DAILY GAUGE-HEIGHT AND DISCHARGE of Davis Creek, at Drury's Ranche, for 1913. *Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.46	2.4	0.45	2.20	0.35	0.50	0.25	0.10
2	.24	2.4	.45	2.20	.35	.50	.25	.10
3	.46	2.4	.44	2.00	.35	.50	.25	.10
4	.47	2.6	.45	2.20	.34	.44	.25	.10
5	.67	8.1	.45	2.20	.34	.44	.25	.10
6	.62	6.4	.45	2.20	.34	.44	.25	.10
7	.49	3.0	.45	2.20	.32	.32	.25	.10
8	.47	2.6	.45	2.20	.32	.32	.25	.10
9	.47	2.6	.45	2.20	.29	.18	.24	.09
10	.47	2.6	.45	2.20	.28	.16	.24	.09
11	.47	2.6	.45	2.20	.29	.18	.23	.08
12	.47	2.6	.45	2.20	.29	.18	.23	.08
13	.49	3.0	.44	2.00	.28	.16	.22	.07
14	.48	2.8	.44	2.00	.28	.16	.23	.08
15	.48	2.8	.43	1.80	.28	.16	.23	.08
16	.48	2.8	.42	1.60	.27	.14	.22	.07
17	.47	2.6	.42	1.60	.27	.14	.22	.07
18	.47	2.6	.42	1.60	.27	.14	.22	.07
19	.47	2.6	.42	1.60	.27	.14	.22	.07
20	.47	2.6	.40	1.20	.27	.14	.21	.06
21	.47	2.6	.40	1.20	.27	.14	.20	.05
22	.47	2.6	.40	1.20	.27	.14	.20	.05
23	.47	2.6	.38	0.92	.27	.14	.19	.05
24	.46	2.4	.38	.92	.27	.14	.19	.05
25	.47	2.6	.37	.78	.27	.14	.19	.05
26	.47	2.6	.36	.64	.27	.14	.19	.05
27	.46	2.4	.36	.64	.27	.14	.18	.04
28	.46	2.4	.36	.64	.26	.12	.18	.04
29	.46	2.4	.35	.50	.25	.10	.18	.04
30	.46	2.4	.35	.50	0.25	0.10	.18	.04
31	0.45	2.2	0.36	0.64	.....	.....	0.18	0.04

MONTHLY DISCHARGE of Davis Creek at Drury's Ranche, for 1913.

(Drainage area 45 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	259.00	2.20	77.400	1.720	1.920	4,609
May	12.80	4.20	7.970	0.177	0.204	490
June	4.20	2.40	2.760	0.061	0.068	164
July	8.10	2.20	2.870	0.064	0.074	176
August	2.20	0.50	1.550	0.034	0.039	95
September	0.50	0.10	0.221	0.005	0.006	13
October	0.10	0.04	0.071	0.002	0.002	4
The period	.....	.....	.....	.....	2.313	5,551

FAIRWELL CREEK AT DRURY'S RANCHE.

This station was established June 10, 1909, by H. R. Carscallen. It is located about eleven miles southeast of Belanger P.O., at Drury's ranche, on the N.W. ¼ Sec. 30, Tp. 6, Rge. 24, W. 3rd Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to a vertical post sunk in the left bank. The zero of the gauge (elev. 95.13) is referred to a permanent iron bench mark (assumed elev. 100.00), located about 20 feet southeast of the gauge. An auxiliary rod was located on this creek to enable gauge heights to be made during extreme high water. The zero of the auxiliary rod has the same elevation as the main rod and is referred to the same bench mark.



View in Valley of Fairwell Creek near East End, Saskatchewan.



View of Frenchman River near Seventy-mile Crossing, Saskatchewan.

The channel is straight for 75 feet upstream, but curves slightly to the right for 50 feet downstream. Both banks are comparatively low and will overflow at high stages of the stream. The banks are covered with brush above and below the station. The bed of the stream is composed of sand and coarse gravel. The current is sluggish at the station, but is swift a short distance below.

Discharge measurements are made by wading, a short distance below the gauge. Owing to the low banks, high water measurements cannot be made. The initial point for soundings is a square stake driven close to the ground at the left bank and marked "I.P."

During 1913, the gauge was read by Ivan A. F. Harris.

There are a number of proposed irrigation schemes which will take their supply from this stream at points above the gauging station. Armstrong and Sons were the only ones to divert water during the season of 1913.

DISCHARGE MEASUREMENTS of Fairwell Creek at Drury's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 17	J. S. Wright & E. W. W. Hughes	38.7	80.20	1.290	3.36	102.00
May 19	E. W. W. Hughes	12.1	10.10	1.740	2.78	17.60
June 19	do	13.1	9.18	0.738	2.47	6.78
July 19	do	11.8	7.38	.786	2.48	5.80
July 28	do	10.1	9.00	.537	2 47	4.83
Aug. 30	do	12.5	3.54	.686	2 40	2.44
Sept. 27	do	11.0	2.35	.419	2 37	1.22
Oct. 18	do	10.0	1.78	.359	2 33	0.64
Nov. 12	do	9.7	1.84	0.365	2 32	0.67

DAILY GAUGE-HEIGHT AND DISCHARGE of Fairwell Creek, at Drury's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2 00	0.05	2 80	18 80	2 59	9.80
2	2 00	0.05	2.78	17.80	2.58	9.40
3	2.00	0 05	2.78	17.80	2.57	9.00
4	2.00	0 05	2 76	16.90	2 56	8.60
5	2.72	15.20	2 74	16 00	2 55	8.20
6	4.47	352.00	2.72	15.20	2.55	8.20
7	4.48	354 00	2.73	15.60	2.55	8.20
8	4.48	354.00	2.74	16.00	2 54	7.80
9	4 48	354.00	2.74	16.00	2 53	7.40
10	4 44	345.00	2 74	16 00	2 53	7.40
11	4 24	300 00	2 74	16.00	2 53	7.40
12	4 21*a*	294 00	2.75	16.40	2 55	8.20
13	4 18	287 00	2.74*a*	16 00	2 55	8.20
14	4 32	319.00	2 71	16.00	2 53	7.40
15	4 00	246 00	2 73	15 60	2 51	6.60
16	3 78	196.00	2 74	16 00	2 51	6.60
17	3 34	98 00	2 75*a*	16 40	2 52	7.00
18	3 28	84 00	2 75	16 40	2 53	7.40
19	3 22	71 00	2 78	17 80	2 49	5.80
20	3 17	61 00	2 65	12 30	2 58	9.40
21	3 12	52 00	2 65	12 30	2 51	6.60
22	3 06	43 00	2 64	11 90	2 49	5.80
23	2 92	27 00	2 63	11 50	2 47	5.00
24	2 92	27 00	2 63	11 50	2 48	5.40
25	2 85	22 00	2 62	11 10	2 51	6.60
26	2 78	17 80	2 62	11 10	2 52	7.00
27	2 62	11.10	2 62	11 10	2 51	6.60
28	2.68	13.50	2 62	11 10	2 49	5.80
29	2 91	26 00	2 61	10 70	2 49	5.80
30	2 96	31 00	2 61	10 70	2 46	4.60
31			2 58	9 30		

a Gauge height interpolated.

DAILY GAUGE-HEIGHT AND DISCHARGE of Fairwell Creek, at Drury's Ranche, for 1913. *Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.45	4.2	2.45	4.2	2.45	4.20	2.37	1.50
2	2.45	4.2	2.44	3.8	2.46	4.60	2.36	1.25
3	2.45	4.2	2.43	3.4	2.45	4.20	2.36	1.25
4	2.60	10.2	2.44	3.8	2.44	3.80	2.35	1.00
5	2.53	7.4	2.44	3.8	2.45	4.20	2.35	1.00
6	2.46	4.6	2.43	3.4	2.45	4.20	2.35	1.00
7	2.45	4.2	2.44	3.8	2.45	4.20	2.35	1.00
8	2.47	5.0	2.46	4.6	2.46	4.60	2.35	1.00
9	2.47	5.0	2.45	4.2	2.45	4.20	2.36	1.25
10	2.51	6.6	2.45	4.2	2.46	4.60	2.36	1.25
11	2.52	7.0	2.45	4.2	2.46	4.60	2.36	1.25
12	2.51	6.6	2.45	4.2	2.45	4.20	2.36	1.25
13	2.53	7.4	2.46	4.6	2.45	4.20	2.36	1.25
14	2.53	7.4	2.46	4.6	2.46	4.60	a2.36	1.25
15	2.51	6.6	2.45	4.2	2.46	4.60	2.36	1.25
16	2.51	6.6	2.45	4.2	2.42	3.00	2.36	1.25
17	2.50	6.2	2.45	4.2	2.37	1.50	2.35	1.00
18	2.50	6.2	2.45	4.2	2.37	1.50	a2.34	0.90
19	2.49	5.8	2.44	3.8	2.37	1.50	2.34	.90
20	2.47	5.0	2.44	3.8	a2.36	1.25	2.34	.90
21	2.47	5.0	2.44	3.8	2.36	1.25	2.34	.90
22	2.50	6.2	2.44	3.8	2.36	1.25	2.34	.90
23	2.50	6.2	2.43	3.4	2.36	1.25	2.34	.90
24	2.50	6.2	2.43	3.4	2.36	1.25	2.34	.90
25	2.46	4.6	2.43	3.4	2.37	1.50	2.34	.90
26	2.50	6.2	2.43	3.4	a2.37	1.50	2.34	.90
27	2.46	4.6	2.43	3.4	2.37	1.50	2.34	.90
28	2.46	4.6	2.43	3.4	2.37	1.50	2.34	.90
29	2.46	4.6	2.42	3.0	2.37	1.50	2.34	.90
30	2.44	3.8	2.43	3.4	a2.37	1.50	2.34	.90
31	2.45	4.2	2.43	3.4	.....	.....	2.34	0.90

a Gauge height interpolated.

MONTHLY DISCHARGE of Fairwell Creek at Drury's Ranche, for 1913.

(Drainage area, 125 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	354.00	0.05	121.56	0.972	1.080	7,232
May	18.80	9.30	14.43	0.115	0.133	885
June	9.80	4.60	7.24	0.058	0.065	431
July	10.20	3.80	5.70	0.046	0.053	350
August	4.60	3.00	3.84	0.030	0.035	236
September	4.60	1.25	2.92	0.023	0.026	173
October	1.50	0.90	1.08	0.009	0.010	66
The period	.....	.....	.....	.....	1.402	9,373

FRENCHMAN RIVER AT GORDON'S RANCHE.

This station was established July 10, 1912, by G. H. Whyte. It is situated about three miles below the mouth of Fairwell Creek and about six miles above the mouth of the North Branch of Frenchman River. It is located on the N.W. ¼ Sec. 16, Tp. 6, Rge. 24, W. 3rd Mer.

The gauge, which is of the chain type, is spiked horizontally to two 8″ by 8″ posts sunk in the right bank and situated about 60 feet upstream from the cable. The zero of the gauge

(elev. 85.69) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank 150 feet west of the gauge. The length of chain from the marker to the bottom of the weight is 16.98 feet.

The river flows in one channel at all stages, which is straight for about 100 feet above and below the station. Both banks are slightly wooded, high and not liable to overflow except in extreme flood stages of the stream. The bed of the stream is composed of clay and gravel and is not liable to shift.

Discharge measurements are made during high water by means of a cable, car, tagged wire, and stay wire. Beaver dams above and below the station affect discharge measurements when the stream is not in flood. During low water, discharge measurements are made by wading at a point about 200 yards below the gauge.

The gauge was read in 1913 by Capt. R. N. S. Gordon.

Discharge Measurements of Frenchman River at Gordon's Ranche, for 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 17	J. S. Wright and E. W.W. Hughes	46.8	182.0	1.230	4.67	225.0
May 17	E. W. W. Hughes.	33.5	41.6	1.320	2.69	55.0
June 20	do	42.3	56.5	1.120	2.89	63.0
July 19	do	27.0	18.8	0.707	2.09	13.2
Sept. 3	do	22.0	9.3	.407	2.30	3.8
Sept. 29	do	22.0	11.2	.550	2.31	6.3
Oct. 18	do	20.0	9.5	.474	2.32	4.5
Nov. 11	do	20.2	9.6	0.383	2.30	3.7

Daily Gauge-height and Discharge of Frenchman River, at Gordon's Ranche, for 1913.

Day.	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.14	16.4	2.14	16.4	1.86	4.2	2.14	3.70	b2.42	11.20
2			2.11	14.6	2.22	21.0	1.94	6.2	2.14	2.10	b2.41	10.60
3			2.10	14.0	2.22	21.0	2.02	9.5	2.12	1.10	2.41	10.40
4			2.09	13.4	2.41	33.0	2.05	11.0	2.10	1.10	2.40	9.90
5			2.09	13.4	2.27	24.0	2.02	9.5	2.10	1.12	2.39	9.00
6			2.09	13.4	2.24	22.0	2.04	10.5	2.10	1.15	2.41	10.00
7			2.08	12.8	2.20	20.0	2.08	12.8	2.11	1.18	2.41	9.80
8			2.04	10.5	2.17	18.2	2.11	14.6	2.12	1.20	2.41	9.60
9			2.00	8.5	2.21	21.0	2.08	12.8	2.16	1.43	2.42	10.00
10			1.98	7.7	2.27	24.0	2.06	11.6	2.19	1.85	2.44	10.90
11			1.98	7.7	2.22	21.0	2.04	10.5	2.19	1.90	2.46	11.90
12			2.00	8.5	2.22	21.0	2.02	9.5	2.22	2.10	2.48	12.70
13			2.08	12.8	2.33	28.0	2.02	9.5	2.22	2.50	2.48	12.60
14			2.10	14.0	2.28	25.0	2.10	14.0	2.21	2.40	2.44	10.10
15			1.96	6.9	2.24	22.0	2.06	11.6	2.20	2.30	2.40	8.00
16	a		1.92	5.6	2.23	22.0	2.06	11.6	2.20	2.30	2.34	5.40
17	2.69	51.0	2.08	12.8	2.20	20.0	2.06	11.6	2.20	2.40	2.30	4.10
18	2.57	43.0	2.38	31.0	2.17	18.2	2.07	12.2	2.20	2.40	2.30	4.00
19	2.52	39.0	2.40	32.0	2.11	14.6	2.05	11.0	2.21	2.60	2.30	3.90
20	2.49	37.0	2.84	61.0	2.08	12.8	2.04	10.5	2.21	2.70	2.30	3.90
21	2.45	35.0	2.40	32.0	2.00	11.6	2.05	11.0	2.21	2.80	b2.30	3.80
22	2.42	33.0	2.24	22.0	2.05	11.0	2.03	10.0	2.30	5.30	b2.31	4.00
23	2.40	32.0	2.18	18.8	2.02	9.5	2.02	9.5	2.43	11.30	b2.31	4.00
24	2.34	2.80	2.12	15.2	2.00	8.5	2.00	8.5	2.47	13.60	b2.31	4.00
25	2.31	27.0	2.14	16.4	1.98	7.7	2.00	8.5	2.50	15.60	b2.32	4.30
26	2.29	25.0	2.50	38.0	1.96	6.9	1.98	7.7	2.50	15.90	2.32	4.30
27	2.26	24.0	2.58	44.0	1.94	6.2	1.98	7.7	2.48	14.90	2.33	4.60
29	2.24	22.0	2.24	22.0	1.92	5.6	2.02	9.5	2.44	12.60	2.34	4.80
29	2.22	21.0	2.13	15.8	1.90	5.0	2.06	8.1	2.44	12.80	2.34	4.90
30	2.19	19.4	2.09	13.4	1.88	4.6	2.10	7.0	b2.43	12.10	2.36	5.50
31	2.17	18.2			1.87	4.4	2.14	6.0			2.38	6.20

a No observations made previous to May 17th.
b Gauge height interpolated.

Monthly Discharge of Frenchman River at Gordon's Ranche, for 1913.

(Drainage area 430 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (17-31)	51.0	18.20	30.30	0.070	0.039	902
June	61.0	6.90	18.50	0.043	0,048	1,100
July	33.0	4.40	16.30	0.038	0.044	1,002
August	14.6	4.20	10.00	0.023	0.026	612
September	15.9	1.10	5.22	0.012	0.013	311
October	12.7	3.80	7.37	0.017	0.020	453
The period					0.190	4,380

ROSE CREEK AT EAST END.

This station was established on May 1, 1911, by G. H. Whyte. It is located on the N.E. ¼ Sec. 26, Tp. 7, Rge. 22, W. 3rd Mer., at East End post office.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a vertical post sunk in the left bank. The zero of the gauge (elev. 91.09) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank about 30 feet downstream from the gauge. The gauge is situated 1324 feet N. 46° 30′ W. of the E. ¼ corner of Sec. 26, Tp. 7, Rge. 22, W. 3rd Mer.

The channel of the stream is straight for about 40 feet above and 75 feet below the station. The right bank is low and liable to overflow, but the left is high and not liable to overflow. The bed of the stream is composed of sand, which has a small amount of vegetation and shifts slightly.

Discharge measurements are made during high water stages by wading at the gauge. The initial point for soundings is a stake on the left bank. During 1913 a permanent weir was established on this stream about 25′ above the gauge rod. The elevation of the crest and the zero of the rod is 92.98, referred to the permanent iron bench mark at the old station (assumed elev. 100.00).

During 1913, the gauge was read by B. E. Rose post master at East End.

B. E. Rose has an irrigation ditch which diverts water from Rose Lake, the source of Rose Creek. No water was diverted by this ditch during 1913.

Discharge Measurements of Rose Creek at East End, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 25	E. W. W. Hughes	2.7	1.6	0.456	0.89	0.73
June 17	do	a			0.76	0.36
Oct. 11	do	a			0.73	0.21
Nov. 1	do	a			0.60	0.21

a Weir measurement.

Daily Gauge-height and Discharge of Rose Creek, at East End, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.96	23 00	0.98	0.87	0.88	0.57
2	1.77	16.90	1.03	1.07	0 85	0.50
3	1.94	22.00	0.99	0.91	0.82	0.44
4	2.42	36.00	1.02	1.03	0.80	0.40
5	2.45	37.00	1.28	3.40	0.74	0.30
6	2.10	27.00	0 99	0.90	0.73	0.29
7	1.96	23.00	1.06	1 21	0.72	0 27
8	1.78	17.20	1.08	1 32	0.70	0.24
9	1.74	16.00	1.05	1.16	0.68	0.21
10	1.75	16.30	1.04	1.12	0.66	0.18
11	1.70	14.80	1 04	1.12	0.68	0.21
12	1.68	14.20	1.04	1 12	0.75	0.32
13	1.41	6.20	1.03	1.07	0.93	0.70
14	1.30	3.70	1.11	1.48	0.72	0.27
15	1.26	3.00	1.08	1.32	0.66	0.18
16	1.20	2.30	1.07	1.26	0.64	1.14
17	1.04	1.12	1.06	1.21	0.66	0.18
18	0.96	0.80	1.03	1.07	0.24*a*	1.15
19	1.03	1.07	1.04	1.12	0.14	0.52
20	1.05	1.16	1.03	1 07	0.70	5.67
21	1.02	1.03	1.02	1.03	0 26	1.30
22	0.93	0.70	1.00	0.94	0 28	1.46
23	0.88	0.57	1.01	0 98	0.25	1.23
24	0.86	0.52	1.00	0.94	0.30	1.62
25	0.86	0.52	1.00	0.94	0.26	1.30
26	0.90	0.61	0 99	0.90	0.26	1.30
27	0.90	0.61	0.99	0.90	0.28	1.46
28	1.00	0.94	0.97	0.83	0.22	1.01
29	1.00	0.94	0.90	0.61	0.18	0.75
30	0.94	0.73	0 94	0.73	0.16	0.64
31	.....	.....	0.90	0.61	.....	.....

a Gauge heights taken on 3′ weir June 18 to Sept 19.

DAILY GAUGE-HEIGHT AND DISCHARGE of Rose Creek, at East End, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.14	0.52	.03	0.05	.06	0.15	.10	0.13
2	.18	0.75	.03	.05	.04	.08	.10	.13
3	.16	0.64	.03	.05	.03	.05	.09	.11
4	.32	1.78	.03	.05	.03	.05	.09	.11
5	.18	0.75	.09	.27	.03	.05	.11	.15
6	.12	0.41	.06	.15	.03	.05	.18	.31
7	.16	.64	.04	.08	.03	.05	.18	.31
8	.10	.32	.05	.11	.03	.05	.16	.26
9	.09	.27	.08	.23	.04	.08	.15	.24
10	.10	.32	.09	.27	.03	.05	.14	.21
11	.17	.69	.06	.15	.03	.05	.14	.21
12	.10	.32	.04	.08	.03	.05	.14	.21
13	.12	.41	.03	.05	.03	.05	.13	.19
14	.13	.46	.10	.32	.04	.08	.12	.17
15	.10	.32	.09	.27	.04	.08	.13	.19
16	.08	.23	.06	.15	.04	.08	.13	.19
17	.06	.15	.05	.11	.01	.08	.13	.19
18	.06	.15	.09	.27	.04	.08	.13	.19
19	.06	.15	.08	.23	.06	.15	.13	.19
20	.05	.11	.06	.15	a .10	.13	.14	.21
21	.05	.11	.04	.08	.08	.09	.14	.21
22	.08	.23	.04	.08	.14	.21	.14	.21
23	.06	.15	.03	.05	.24	.47	.14	.21
24	.06	.15	.03	.05	.16	.26	.13	.19
25	.05	.11	.03	.05	.14	.21	.13	.19
26	.04	.08	.03	.05	.12	.17	b .14	.21
27	.05	.11	.03	.05	.10	.13	b .14	.21
28	.04	.08	.03	.05	.10	.13	.15	.24
29	.04	.08	.03	.05	.10	.13	.15	.24
30	.04	.08	.04	.08	.10	0.13	.15	.24
31	.04	0.08	.08	0.23	.....	.....	.14	0.21

a Weir changed from 3′ crest to 15″ crest on Sept. 20.
b Gauge height interpolated.

MONTHLY DISCHARGE of Rose Creek at East End, for 1913.

(Drainage area 13 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	37.00	0.52	9.480	0.729	0.813	564
May	3.40	0.61	1.100	0.085	0.098	68
June	5.70	0.14	0.827	0.064	0.071	49
July	1.78	0.08	0.344	0.026	0.030	21
August	0.32	0.05	0.126	0.010	0.012	8
September	0.47	0.05	0.114	0.009	0.010	7
October	0.31	0.11	0.209	0.016	0.018	13
The period	.....	.....	.....	.....	1.052	730

NORTH BRANCH OF FRENCHMAN RIVER AT CROSS' RANCHE.

This station was established July 25, 1908, by F. T. Fletcher. It is located on the N.E. ¼ Sec. 16, Tp. 7, Rge. 22, W. 3rd Mer., about two and one-half miles from East End post office, and about forty-five miles southeast of Maple Creek by trail.

The gauge, which is a plain staff graduated to feet and hundredths, is placed vertically at the right bank about one mile downstream from the intake of Frank Cross' irrigation ditch, and one hundred yards below his house. The zero of the gauge (elev. 90.27) is referred to a permanent iron bench mark (assumed elev. 100.00), situated 260 feet northeast of the gauge and 1315 feet S. 5° 36′ W. from the N.E. corner of Sec. 16, Tp. 7, Rge. 22, W. 3rd Mer.

The channel is straight for about 100 feet above and 400 feet below the station. Both banks are fairly high, but are liable to overflow during floods. The bed of the stream is sandy and may shift at high stages. The current is smooth and fairly swift.

Discharge measurements are made at or near the gauge by wading. The initial point for soundings is a aquare hardwood plug, driven into the ground on the right bank of the stream and marked "B.M." with white paint.

During 1913 the gauge was read by Frank Cross.

Irrigation ditches owned by F. Cross, H. Cross and W. F. McNicol take their supply from this stream above the gauging station; F. Cross and H. Cross were the only ones to divert water during 1913.

DISCHARGE MEASUREMENTS of North Branch Frenchman River at Cross' Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 19	E. W. W. Hughes	11.2	9.68	1.550	1.37	14.6
April 24	do	11.1	7.74	1.200	1.31	9.3
April 25	do	11.1	7.70	1.280	1.34	9.8
May 9	do	11.1	8.26	1.250	1.41	10.3
May 15	do	11.0	9.34	1.330	1.37	12.4
June 13	do	11.2	8.65	1.210	1.28	12.5
June 13	do	11.2	11.56	1.530	1.54	a 17.6
July 14	do	11.0	9.92	1.210	1.32	12.0
July 30	do	11.0	5.75	0.956	1.09	5.5
Aug. 21	do	11.9	6.34	0.894	1.08	5.5
Sept. 15	do	11.0	5.35	0.854	1.07	4.6
Oct. 11	do	11.0	6.42	1.060	1.16	6.8
Nov. 3	do	11.0	8.86	0.746	1.35	6.6

a F. Cross empty ng his reservoir caused high di:charge at gauge.

DAILY GAUGE-HEIGHT AND DISCHARGE of North Branch of Frenchman River, at Cross' Ranche, for 1913.

DAY.	April.		May.		June.	
	Gauge Heght.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.65	232.0	1.41	11.1	1.19	8.0
2	4.41	212.0	1.45	12.1	1.19	8.0
3	4.38	210.0	1.40	10.6	1.18	7.8
4	4.41	212.0	1.38	10.0	1.17	7.6
5	4.42	212.0	1.51	13.8	1.15	7.2
6	4.71	237.0	1.40	10.3	1.10	6.1
7	4.41	212.0	1.37	9.4	1.08	5.7
8	4.11	186.0	1.45	11.5	1.05	5.1
9	3.33	112.0	1.41	10.3	1.03	4.8
10	3.81	129.0	1.40	10.6	1.00	4.2
11	3.43	119.0	1.34	9.6	0.94	3.1
12	3.41	114.0	1.34	9.9	0.98	3.8
13	2.21	48.0	1.33	10.2	1.28	10.4
14	1.86	33.0	1.42	13.4	1.25	9.7
15	1.56	18.0	1.42	19.3	1.11	6.4
16	1.41	14.0	1.36	12.2	0.94	3.1
17	1.41	14.0	1.36	12.2	0.92	2.9
18	1.40	13.0	1.34	11.6	1.45	15.6
19	1.41*a*	14.0	1.32	11.1	1.03	4.9
20	1.38	14.3	1.32	11.1	2.00	37.0*b*
21	1.38	13.6	1.30	10.5	1.40	14.1
22	1.37	12.4	1.29	10.3	1.25	9.8
23	1.35	11.1	1.29	10.3	1.30	11.2
24	1.31	9.3	1.28	10.1	1.45	16.7
25	1.35	10.1	1.28	10.1	1.42	14.8
26	1.34	9.7	1.27	9.9	1.50	17.4
27	1.34	9.6	1.27	9.9	1.40	14.2
28	1.36	10.0	1.26	9.6	1.30	11.3
29	1.39	10.7	1.25	9.4	1.27	10.5
31	1.37	10.1	1.25	9.4	1.25	10.0
31	.....	.....	1.24	9.2	.....	.....

a Shifting conditions commence.
b F. Cross emptying his reservoir.

DAILY GAUGE-HEIGHT AND DISCHARGE of North Branch of Frenchman River, at Cross' Ranche, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.20	8.7	1.11	6.0	1.16	7.0	1.15	6.6
2	1.25	10.0	1.10	5.8	1.12	6.1	1.15	6.6
3	1.24	9.7	1.08	5.4	1.12	6.0	1.16	6.9
4	1.52	18.2	1.06	5.0	1.13	6.2	1.17	7.1
5	1.35	12.9	1.11	6.0	1.12	6.0	1.19	7.5
6	1.25	10.0	1.16	7.1	1.11	5.7	1.24	8.7
7	1.33	12.3	1.14	6.7	1.09	5.3	1.25	9.0
8	1.20	8.7	1.14	6.7	1.10	5.5	1.23	8.6
9	1.15	7.6	1.15	6.9	1.12	5.9	1.22	8.3
10	1.18	8.6	1.29	10.3	1.12	5.9	1.20	7.8
11	1.30	11.4	1.18	7.6	1.11	5.6	1.20	7.9
12	1.18	8.3	1.12	6.3	1.10	5.3	1.20	7.9
13	1.16	7.8	1.10	5.9	1.11	5.5	1.19	7.7
14	1.32	12.0	1.15	7.0	1.11	5.5	1.20	7.9
15	1.25	10.0	1.22	8.5	1.12	5.7	1.21	8.1
16	1.27	10.6	1.14	6.8	1.13	5.8	1.21	8.1
17	1.19	8.5	1.13	6.6	1.14	6.0	1.23	8.6
18	1.09	6.3	1.16	7.2	1.14	6.1	1.25	9.1
19	1.08	6.0	1.16	7.2	1.15	6.3	1.28	9.9
20	1.09	6.2	1.12	6.4	1.16	6.5	1.26	9.4
21	1.10	6.5	1.13	6.6	1.16	6.5	1.25	9.1
22	1.11	6.6	1.11	6.3	1.17	6.8	1.22	8.4
23	1.11	6.6	1.11	6.3	1.34	11.0	1.19	7.7
24	1.10	6.3	1.12	6.5	1.28	9.4	1.18	7.4
25	1.10	6.3	1.11	6.2	1.21	7.7	1.17	7.2
26	1.12	6.6	1.09	5.8	1.19	7.3	1.17	7.2
27	1.13	6.7	1.09	5.7	1.18	7.1	1.18	7.4
28	1.13	6.6	1.09	5.7	1.17	7.0	1.17	7.2
29	1.11	6.1	1.10	5.9	1.16	6.8	1.16	7.0
30	1.13	6.4	1.11	6.1	1.16	6.8	1.19	7.7
31	1.12	6.1	1.16	7.1			1.21	8.1

MONTHLY DISCHARGE of North Branch of Frenchman River at Cross' Ranche, for 1913.

(Drainage area, 53 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	237.0	9.3	82.10	1.550	1.730	4,885
May	13.9	9.2	10.40	0.196	0.226	640
June	37.0	2.9	9.71	0.183	0.204	578
July	18.2	6.0	8.54	0.161	0.186	525
August	10.3	5.0	6.57	0.124	0.143	404
September	11.0	5.3	6.48	0.122	0.136	386
October	9.9	6.6	7.94	0.150	0.173	488
The period					2.798	7,906

FRENCHMAN RIVER AT PHILLIPS' RANCHE.

This station was established July 9, 1912, by G. H. Whyte. It is located on Phillips' Ranche, in the N.E. ¼ Sec. 23, Tp. 6, Rge. 23, W. 3rd Mer. It is 13 miles by trail from East End post office.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the left bank about 900 feet upstream from the station. The zero (elev. 90.02) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank and about 25 feet N.E. of the gauge.

The river flows in one channel at all stages. It is straight for 300 feet above and 500 feet below the station. Both banks are slightly wooded, high and not liable to overflow. The bed of the stream is composed of sand and gravel.

Discharge measurements are made during high water by means of a cable car, tagged wire and stay wire, and at low stages by wading. The initial point for soundings is the anchorage on the left bank, and marked I. P. 0+00.

During 1913 the gauge was read by A. A. Phillips.

DISCHARGE MEASUREMENTS of Frenchman River at Phillips' Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 18	J. S. Wright & E. W. W. Hughes.	44.0	72.8	3.040	2.71	222.0
May 16	E. W. W. Hughes	46.1	65.1	1.280	1.92	84.0
June 18	do	47.6	70.8	0.847	1.81	60.0
July 17	do	42.7	40.0	.566	1.36	23.0
Aug. 2	do	42.0	32.4	.418	1.20	13.5
Aug. 22	do	42.5	33.3	.406	1.21	13.5
Sept. 24	do	43.4	33.7	.472	1.27	15.9
Oct. 17	do	42.0	34.4	.450	1.27	15.4
Nov. 10	do	42.2	34.0	0.456	1.26	15.6

DAILY GAUGE-HEIGHT AND DISCHARGE of Frenchman River, at Phillips' Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.86	70	1.45	28.0
2			1.82	66	1.45	28.0
3			1.86	70	1.44	27.0
4			1.85	69	1.45	28.0
5			1.80	63	1.44	27.0
6	6.25	999	1.82	66	1.42	26.0
7	6.55	1,065	1.77	60	1.40	24.0
8	7.46	1,265	1.76	59	1.38	23.0
9	6.14	975	1.76	59	1.36	21.0
10	5.51	836	1.76	59	1.35	20.0
11	5.17	761	1.76	59	1.34	19.7
12	5.08	742	1.74	57	1.34	19.7
13	5.35	801	1.72	54	1.35	20.0
14	4.74	667	1.79	62	1.46	29.0
15	4.36	583	1.90	75	1.36	21.0
16	3.95	493	1.92	77	1.39	23.0
17	3.45	383	1.88	72	1.55	37.0
18	2.71	222	1.84	68	1.70	52.0
19	2.66	211	1.81	65	1.56	38.0
20	2.56	190	1.72	54	1.68	50.0
21	2.46	170	1.70	52	2.21	123.0
22	2.26	132	1.69	51	1.66	48.0
23	2.08	102	1.65	47	1.59	41.0
24	1.92	78	1.65	47	1.69	51.0
25	1.86	70	1.62	44	1.61	43.0
26	1 76	59	1.54	36	1.67	49.0
27	1.75	58	1.50	32	1.67	49.0
28	1 81	65	1.48	31	1.62	44 0
29	1 88	72	1.46	29	1.54	36.0
30	1 90	75	1.45	28	1 47	30.0
31			1.45	28		

Daily Gauge-height and Discharge of Frenchman River, at Phillips' Ranche, for 1913. *Concluded.*

Day.	July.		August.		September.		October.	
	Gauge. Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.	Gauge Height.	Dis-charge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.46	29.0	1.21	13.7	1.15	12.5	1.26	15.3
2	1.47	30.0	1.20	13.4	1.14	12.4	1.26	15.3
3	1.45	28.0	1.18	13.0	1.14	12.4	1.25	14.8
4	1.45	28.0	1.17	12.9	1.14	12.4	1.26	15.3
5	1.48	31.0	1.19	13.2	1.13	12 2	1.28	16.2
6	1.46	29.0	1.21	13.7	1.10	11.8	1.30	17.2
7	1.50	32.0	1.24	14.5	1.10	11.8	1.28	16.2
8	1.54	36.0	1.22	14.0	1.11	11.9	1.26	15.3
9	1.52	34.0	1.21	13.7	1.08	11.6	1.26	15.3
10	1.47	30.0	1.21	13.7	1.08	11.6	1 26	15.3
11	1.44	27.0	1.21	13.7	1.08	11.6	1.26	15.3
12	1.44	27.0	1.20	13.4	1.07	11.5	1.24	14.5
13	1.47	30.0	1.20	13.4	1.08	11.6	1.22	14.0
14	1.45	28.0	1.22	14.0	1.10	11.8	1.24	14.5
15	1.45	28.0	1.23	14.2	1.12	12.0	1.25	14.8
16	1.44	27.0	1.26	15.3	1.14	12 4	1.24	14.5
17	1.38	23.0	1.26	15.3	1.15	12.5	1.24	14.5
18	1.18	13.0	1.28	16.2	1.16	12.7	1.24	14.5
19	1.35	20.0	1.26	15.3	1.20	13.4	1.26	15.3
20	1.34	19.7	1.26	15.3	1.18	13.0	1.25	14.8
21	1.32	18 4	1.25	14.8	1.19	13.2	1.25	14.8
22	1.33	19.0	1.22	14.0	1.29	16.7	1.24	14.5
23	1.32	18.4	1.20	13.4	1.30	17.2	1.25	14.8
24	1.30	17.2	1.18	13.0	1.30	17.2	1.24	14.5
25	1.31	17.8	1.18	13.0	1.30	17.2	1.25	14.8
26	1.27	15.8	1.16	12.7	1.28	16.2	1.24	14.5
27	1.26	15.3	1.16	12.7	1.26	15.3	1.26	15.3
28	1.25	14.8	1.14	12.4	1.24	14.5	1.30	17.2
29	1.25	14.8	1.14	12 4	1.25	14.8	1.36	21.0
30	1.25	14.8	1.14	12.4	1.24	14 5	1.75	58.0
31	1.23	14.2	1.16	12.7	.....	.....	1.50	32.0

Monthly Discharge of Frenchman River at Phillips' Ranche, for 1913.

(Drainage area, 598 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per Square Mile.	Depth in inches on Drainage. Area.	Total in Acre-feet.
April (6th-30th)	1265.0	58.0	443.0	0.741	0.689	21,965
May	77.0	28.0	55.0	0.092	0.106	3,388
June	123.0	19.7	36.0	0.060	0.067	2,130
July	36.0	13.0	24.0	0.039	0.045	1,451
August	16.2	12.4	13.7	0.023	0.026	842
September	17.2	11.5	13.3	0.022	0.024	791
October	58.0	14.0	17.2	0.029	0.033	1,058
The period					0.990	31,625

STRONG AND DAY'S DITCH NEAR EAST END.

This station was established July 31, 1908, by F. T. Fletcher. On April 17, 1911 it was moved upstream by G. H. Whyte. It is located on the N.E. ¼ Sec. 25, Tp. 6, Rge. 22, W. 3rd Mer., and is three quarters of a mile above the old station and about half a mile below the headgate of the ditch.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the right bank of the ditch. It is referred to bench marks as follows:—(1) A spike on the initial post, which is about six inches above ground, on the left bank of the ditch; elevation 5.49 feet

above the datum of the gauge. (2) The top of a plug, about four inches above ground, on the top of the right bank and about 50 feet downstream from the gauge; elevation 7.52 feet above the datum of the gauge.

The ditch is straight for about 250 feet above and 100 feet below the station. The current is rather sluggish and, during a greater part of the season, vegetation in the ditch causes considerable trouble in making discharge measurements.

Discharge measurements are made at the rod by wading, or from the old bridge station; (for description see 1910 report). The initial point for soundings at the station is a plug on the left bank, 23 feet from the rod.

During 1913, the gauge was read by Miss M. E. H. Robertson.

DISCHARGE MEASUREMENTS of Strong and Day's Ditch near East End, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 9.....	E. W. W. Hughes.....	16.9	14.7	1.06	1.36	15.62

DAILY GAUGE-HEIGHT AND DISCHARGE of Strong and Day's Ditch, near East End, for 1913.

DAY.	May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.05	8.90
2	.....	.....	1.05	8.90
3	.....	.....	1.05	8.90
4	.....	.....	1.05	8.90
5	.....	.....	1.06	9.10
6	.....	.....	1.13*a*	10.50
7	.....	.....	1.21*a*	12.24
8	.....	.....	1.29*a*	14.24
9	.....	.....	1.36*a*	16.06
10	.....	.....	.....	.....
11	.....	.....	.....	.....
12	.....	.....	.....	.....
13	.....	.....	.....	.....
14	.....	.....	.....	.....
15	.....	.....	.....	.....
16	.....	.....	.....	.....
17	.....	.....	.....	.....
18	.....	.....	.....	.....
19	.....	.....	.....	.....
20	0.07	0.00	.....	.....
21	0.10	0.00	.....	.....
22	1.00	8.00	.....	.....
23	1.02	8.36	.....	.....
24	1.02	8.36	.....	.....
25	1.02	8.36	.....	.....
26	1.02	8.36	.....	.....
27	1.02	8.36	.....	.....
28	1.03	8.54	.....	.....
29	1.05	8.90	.....	.....
30	1.05	8.90	.....	.....
31	1.05	8.90	.....	.....

a Gauge height interpolated.
b No gauge heights observed after June 9th.

MONTHLY DISCHARGE of Strong and Day's Ditch near East End, for 1913.

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage. Area.	Total in Acre-feet.
May (20-31)	8.90	8.00	7.09	.....	.....	169
June (1-9)	16.06	8.90	10.86	.....	.....	194
The period	.....	.....	.....	.....	.....	363

FRENCHMAN RIVER AT STRONG AND DAY'S RANCHE.

This station was established July 31, 1908, by F. T. Fletcher. It is located at Strong and Day's highway bridge on the N.E. ¼ Sec. 31, Tp. 6, Rge. 21 W. 3rd Mer., and is about eight miles south of East End post office and a mile above the East End police detachment.

The gauge, which is of the standard chain type, is fixed to the floor of the east end of the upstream side of the bridge. The length of chain from the marker to the bottom of the weight is 16.80 feet. The zero of the gauge (elev. 85.54) is referred to a permanent iron bench mark (assumed elev. 100.00), situated 240 feet N. 11° E. from the gauge. This gauge reads one foot higher than the staff gauge used during previous years.

The channel is straight for 300 feet above and 600 feet below the station. Both banks are high and not liable to overflow. The bed of the stream is composed of sand and gravel. The current is sluggish.

Discharge measurements are made from the lower side of the bridge during high water stages, and at a wading section a short distance upstream during low water stages. The initial point for soundings is the inner face of the left abutment. The bridge is not quite at right angles to the direction of the current.

During 1913 the gauge was read by Miss Robertson until August 22nd, after which no observer could be obtained.

Three miles above the station are the dam and headgates of Messrs. Strong and Day's ditch and hence the discharge of the stream at the station does not include that of the ditch and the latter must be added in order to obtain the total flow of the Frenchman River.

DISCHARGE MEASUREMENTS of Frenchman River at Strong and Day's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 24	J. S. Wright & E. W. W. Hughes.	33.8	55.2	1.92	3.05	106.0
May 12	E. W. W. Hughes	30.0	38.0	1.86	2.69	71.0
June 9	do	25.5	12.8	1.12	1.66	14.4
July 14	do	26.0	26.3	0.94	2.19	25.0
July 30	do	23.5	14.4	0.99	1.93	14.3
Aug. 24	do	24.5	15.9	0.82	2.03	13.1
Oct. 16	do	29.0	27.8	0.52	3.69	14.4
Nov. 7	do	32.5	21.2	0.86	3.69	18.2

Daily Gauge-height and Discharge of Frenchman River, at Strong and Day's Ranche for 1913.

Day.	April.		May.		June		July.		August.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	2.74	72	2.40	68.0	2.30	30.0	1.92	17.4
2	.....	.....	2.66	64	1.39	67.0	2.26	28.0	1.90	17.0
3	....a	.....	2.61	59	2.30	57.0	2.25	28.0	1.90	17.0
4	6.05	498	c 2.57	55	2.23	48.0	2.25	28.0	1.90	17.0
5	6.76	590	c 2.57	56	2.13	39.0	2.26	28.0	1.90	17.0
6	8.60	830	c 2.57	56	1.80	21.0	2.28	29.0	1.90	17.0
7	10.90	1135	c 2.58	57	1.76	19.0	2.28	29.0	1.90	17.0
8	11.25	1174	c 2.58	58	1.70	16.0	2.27	28.0	1.90	17.0
9	8.65	836	c 2.58	58	d 1.66	14.0	2.21	26.0	1.90	17.0
10	8.06	759	c 2.58	58	1.61	14.1	2.11	22.0	1.90	17.0
11	7.41	675	c 2.58	59	1.53	13.6	c 2.12	22.0	1.90	17.0
12	7.44	679	2.59	60	1.46	13.3	2.12	22.0	1.90	17.0
13	7.54	693	2.60	63	1.56	13.7	c 2.15	23.0	1.90	17.0
14	7.14	640	2.57	62	1.49	13.5	2.18	24.0	1.92	17.4
15	6.11	506	2.62	69	1.55	13.7	2.15	23.0	1.95	18.0
16	5.31	402	2.65	75	1.55	13.7	2.12	22.0	1.98	18.6
17	4.80	336	2.67	80	1.57	13.8	2.11	22.0	1.98	18.6
18	4.18	255	2.69	84	1.87	16.4	c 2.10	22.0	2.00	19.0
19	3.58	177	2.75	94	2.17	24.0	2.10	22.0	2.04	19.8
20	b2.60	52	2.74	94	2.78	71.0	2.08	21.0	2.05	20.0
21	3.10	114	2.72	94	2.73	65.0	2.05	20.0	2.05	20.0
22	3.00	100	2.70	93	2.78	71.0	2.02	19.4	2.05	20.0
23	3.15	120	2.71	95	2.82	76.0	2.00	19.0	2.03	19.6
24	d 3.05	107	2.74	98	2.73	65.0	1.98	18.6	e	.....
25	2.70	62	2.79	110	2.69	61.0	1.96	18.2	.....	.....
26	2.40	36	2.73	104	2.60	52.0	1.95	18.0	.....	.....
27	2.60	52	2.70	101	2.55	48.0	1.94	17.8	.....	.....
28	2.65	57	2.67	99	2.49	42.0	1.92	17.4	.....	.....
29	2.68	60	2.65	98	2.44	38.0	1.90	17.0	.....	.....
30	2.70	62	2.56	87	2.39	35.0	1.93	17.6	.....	.....
31	.....	.....	2.51	81	.....	.....	1.92	17.4	.....	.....

a Ice in river.
b Putting flash boards in Strong and Day's dam.
c Gauge height interpolated.
d Shifting conditions April 24th to June 9th.
e No observer after Aug. 23.

Monthly Discharge of Frenchman River at Strong and Day's Ranche, for 1913.

(Drainage area, 683 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square. Mile.	Depth in inches on Drainage. Area.	Total in Acre-feet.
April (4-30)	1,174	36.0	408.0	0.597	0.599	21,832
May	118	55.0	79.9	0.117	0.135	4,913
June	77	13.3	40.7	0.060	0.067	2,422
July	30	17.0	23.0	0.033	0.038	1,390
August (1-23)	20	17.0	17.9	0.026	0.022	818
The period					0.861	31,375

Note.—This table shows the total discharge of the river and Strong and Day's ditch at this point.

MORRISON BROTHERS' DITCH NEAR EAST END.

This station was established August 22, 1911, by G. R. Elliott. It is located on the S.W. ¼ Sec. 26, Tp. 6, Rge. 21, W. 3rd Mer., one half mile below the intake of the ditch at the Frenchman River.

The gauge is a plain staff 3" X 1", graduated to feet and inches, and is on the right side of the ditch. The zero of the gauge (elev. 97.36) is referred to the top of a rock (assumed elev. 100.00) 300 feet downstream on the right bank, marked "B.M." with red paint.

The station is at a uniform cross-section of the ditch, which is seven feet wide at the bottom with side slopes of 4 to 1.

During 1913 the gauge was read by A. A. Morrison.

DISCHARGE MEASUREMENTS of Morrison Brothers' Ditch near East End, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 12	E. W. W. Hughes	10.0	5.91	0.38	0.50	2.3
July 12	do	11.3	12.0	0.58	1.33	7.0

DAILY GAUGE-HEIGHT AND DISCHARGE of Morrison Brothers' Ditch, near East End, for 1913.

DAY.	June.		July.		August.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1					1.00	5.10
2					1.00	5.1
3					0.96*a*	4.9
4					0.92	4.7
5					0.92	4.7
6					0.92	4.7
7					0.83	4.1
8					0.83	4.1
9					0.83	4.1
10					0.79*a*	3.9
11			1.33*b*	7.0	0.75	3.7
12	0.50*b*	2.2	1.33	7.0	0.75	3.7
13	0.58	2.7	1.50	8.0	0.67	3.2
14	0.83	4.1	1.50	8.0	0.67	3.2
15	1.08	5.6	1.50	8.0	0.67	3.2
16	1.21	6.4	1.50	8.0	0.75	3.7
17	1.17	6.1	1.50	8.0	0.75	3.7
18	1.42*a*	7.6	1.42	7.6	0.75	3.7
19	1.67	9.0	1.33	7.0	0.64*a*	3.0
20	1.58*a*	8.5	1.33	7.0	0.58	2.7
21	1.50	8.0	1.25	6.6	0.50	2.2
22	1.50*a*	8.0	1.25	6.6	0.50	2.2
23	1.50	8.0	1.25	6.6	0.46*a*	2.00
24	1.50	8.0	1.25	6.6	0.42	1.79
25	1.50	8.0	1.25	6.6	0.42	1.79
26	1.50	8.0	1.17	6.1	0.33	1.32
27			1.08*a*	5.6	0.33*a*	1.32
28			1.00	5.1	0.33*c*	1.32
29			1.00	5.1		
30			1.00	5.1		
31			1.00	5.1		

a Gauge heights interpolated
b Head gate opened.
c Head gate closed.

Monthly Discharge of Morrison Brothers' Ditch near East End, for 1913.

(Discharge area, —— square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square. Mile.	Depth in inches on Drainage. Area.	Total in Acre-feet.
June (12-26)	9.0	2.2	6.68			199
July (11-31)	8.0	5.1	6.70			279
August (1-28)	5.1	1.32	3.33			185
The period						663

Miscellaneous Discharge Measurements made in Frenchman River drainage basin in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per Sec.*	*Sec.-ft.*
April 18	J. S. Wright and E.W.W. Hughes.	Blacktail Creek	N.E 30-6-23-3	7.0	6.26	0.21	1.31
April 25	E.W.W. Hughes.	Calf Creek	4-8-22-3	4.7	1.90	0.87	1.65
May 10	do	do	do	5.2	2.10	0.77	1.62
June 14	do	do	do	3.7	1.47	1.10	1.52
July 15	do	do	do	6.1	2.85	0.60	1.70
Oct. 11	do	do	do	4.6	2.16	0.57	1.20
May 16	do	Concrete Coulee	N.W. 2-7-23-3	4.9	3.32	0.70	2.31
June 18	do	do	do	6.2	3.89	0.40	1.57
July 17	do	do	do	5.3	0.15	0.86	0.99
Aug. 22	do	do	do	6.1	1.48	0.78	1.14
May 21	do	Cypress Lake overflow	S.E. 24-6-26-3	17.9	9.16	0.24	2.21
June 23	do	do	do	9.0	2.15	0.57	1.22
July 26	do	do	do	8.3	1.95	0.37	0.72
Sept. 2	do	do	do	a			0.01
June 18	do	Doyle Coulee	S.E. 17-7-22-3	4.1	2.00	0.18	0.36
Aug. 22	do	do	do	a			0.18
Sept. 24	do	do	do	a			0.19
June 20	do	Dry Coulee	N.W. 16-6-24-3	15.7	9.49	0.68	6.46
June 11	do	Frenchman River	Sec. 21-5-17-3	35.6	20.95	0.75	15.70
June 11	do	Mule Creek	S.E. 34-5-17-3	6.0	1.70	0.38	0.64
June 18	do	S. Pearse's Ditch	N.W. 2-7-23-3	3.7	1.75	0.43	0.75
May 16	do	Petrified Coulee	N.E. 7-20-22-3	a			0.62
June 18	do	do	do	a			0.95
Aug. 22	do	do	do	a			0.21
Sept. 24	do	do	do	a			0.62
May 28	H.R. Carscallen.	Rocky Creek	S.E. 6-8-27-3	a			0.29
Aug. 12	P.V. Binns	Spring Creek	N.E. 7-7-22-3	a			0.17

a Weir measurement.

SWIFTCURRENT CREEK DRAINAGE BASIN.

General Description.

Swiftcurrent Creek rises in the eastern slope of the Cypress hills, follows a north-easterly course for 75 miles and then a northerly one for about 25 miles and finally empties into the South Saskatchewan River in Tp. 20, Rge. 13, W. 3rd Mer.

The only important tributary is Bone Creek, which rises in the Cypress hills and joins the Swiftcurrent in Tp. 10, Rge. 19, W. 3rd Mer.

The main stream flows through a valley, two to three hundred feet deep and a mile wide, to within a few miles of its mouth, where it enters a sand-stone gorge, about five hundred feet deep.

The bench land above the creek is of rolling prairie broken by innumerable coulees. The soil is a sandy loam. There is very little tree growth along the stream.

The mean annual rainfall at the twon of Swift Current is about 15 inches. This increases slightly at the stream's headwaters. The greatest precipitation occurs during the months of May, June, and July. From November to April the stream is frozen over.

There are a number of small irrigation ditches in this drainage basin, and the town of Swift Current and the Canadian Pacific Railway Company take water for domestic and industrial purposes from the creek.

POLLOCK DITCH NEAR SOUTH FORK.

This station was established August 10, 1911, by G. R. Elliott on the irrigation ditch of D. Pollock, which diverts water from Swiftcurrent creek. It is located on the N.W. ¼ Sec. 22, Tp. 7, Rge. 21, W. 3rd Mer.

The gauge, which is a plain staff graduated to feet and inches, is situated at the left side of the ditch, 20 feet from the intake. The zero (elev. 91.96) is referred to a permanent iron bench mark (assumed elev. 100.00), located at the gauging station on Swiftcurrent Creek, which is three quarters of a mile below the intake of the ditch.

The station is at a uniform section of the ditch, which is one and a half feet wide at the bottom and has side slopes of one to one and two to one.

During 1913, the gauge was read by D. Pollock.

DISCHARGE MEASUREMENTS of Pollock's Ditch near South Fork, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
June 7	E. W. W. Hughes	[a]			.038	0.65

a Weir measurement.

DAILY GAUGE-HEIGHT AND DISCHARGE[a] of Pollock's Ditch, near South Fork, for 1913.

Day.	May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			0.46	0.85	0.33	0.56
2			0.46	0.85	0.42	0.75
3			0.46	0.85	0.33	0.56
4			0.46	0.85	0.50	0.94
5			0.46	0.85	0.42	0.75
6			0.42	0.75	0.38	0.66
7			0.38	0.66	0.33	0.56
8			0.38	0.66	0.33	0.56
9			0.38	0.66	[c]	
10			0.38	0.66		
11			0.33	0.56		
12			0.54	1.04		
13			0.38	0.66		
14			0.38	0.66		
15			0.38	0.66		
16			0.50	0.94		
17			0.50	0.94		
18			0.42	0.75		
19			0.42	0.75		
20			0.83	1.70		
21			0.67	1.32		
22			0.83	1.70		
23			0.83	1.70		
24			0.83	1.70		
25			0.83	1.70		
26			0.83	1.70		
27			0.75	1.51		
28	0.46[b]	0.85	0.50	0.94		
29	0.48	0.89	0.42	0.75		
30	0.46	0.85	0.42	0.75		
31	0.46	0.85				

a Discharges are estimates based on one measurement.
b Head gate opened.
c Head gate closed.

Monthly Discharge of Pollock's Ditch near South Fork, for 1913.

Month.	Discharge in Second-Feet.			Run-Off.		
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (28-31)	0.89	0.85	0.860			7
June	1.70	0.56	1.020			62
July (1-8)	0.94	0.56	0.668			11
The period						80

SWIFTCURRENT CREEK AT POLLOCK'S RANCHE.

This station was established May 18, 1909, by H. R. Carscallen. It is located on the S.W. ¼ Sec. 22, Tp. 7, Rge. 21, W. 3rd Mer., about 4 miles southwest of Southfork P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a post sunk in the bed of the stream at the right bank and firmly stayed. The zero of the gauge (elev. 88.76) is referred to a permanent iron bench mark (assumed elev. 100.00), situated 138 feet N. 30° E. of the gauge.

The channel is straight for 50 feet above and 15 feet below the station. Both banks are high and not liable to overflow. The bed of the stream is composed of sand and gravel. The current is moderate at ordinary stages, but sluggish at very low stages of the stream.

Discharge measurements are made at or near the gauge by wading at ordinary stages, and at very low stages a weir is used.

During 1913, the gauge was read by D. Pollock.

Mr. D. Pollock diverts water from the creek into an irrigation ditch about one half mile above the gauge; therefore when he is using water in his ditch the gauge does not record the total flow of the creek.

Discharge Measurements of Swiftcurrent Creek at Pollock's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 21	E. W. W. Hughes	4.5	2.75	0.890	1.73	2.45
May 15	do	4.4	2.60	0.773	1.50	2.01
June 7	do				1.15	*a*0.74
July 10	od				1.39	*a*1.01
Aug. 4	do	4.5	1.35	0.888	1.19	1.20
Aug. 28	do	4.5	1.40	.707	1.14	0.99
Sept. 15	do	3.0	1.33	0.706	1.20	0.94
Oct. 14	do	4.2	1.38	1.030	1.24	1.41
Nov. 3	do	4.0	1.91	0.701	1.39	1.34

a Weir measurement.

Daily Gauge-height and Discharge of Swiftcurrent Creek, at Pollock's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.44	1.82	1 28	1.17
2			1.43	1.82	1 28	1.18
3			1.58	2 20	1 21	0.96
4			1.59	2.20	1.18	0.88
5			1.54	2.10	1.17	0.83
6			1.53	2.00	1.16	0.79
7		*a*	1.54	2.10	1.17	0.78
8	5.43	11.00	1.59	2 20	1.17	0.77
9	5.38	10.90	1.53	2.10	1.17	0.77
10	4.38	8.60	1.59	2.20	1.15	0.72
11	2.38	4.00	1.56	2.10	1.14	0.68
12	3.28	6.10	1.52	2.00	1.18	0.77
13	3.18	5.80	1.52	2.00	1.15	0.69
14	2.98	5.40	1.62	2.30	1.15	0.68
15	2.48	4.20	1.61	2.30	1.15	0.67
16	2.28	3.80	1.63	2.30	1.18	0.73
17	2.27	3.70	1.61	2 20	1.36	1.16
18	2.26	3.70	1.57	2.10	1.16	0.67
19	2.26	3.70	1.52	1.98	1.16	0.66
20	1.73	2.50	1.48	1.86	1.84	2.40
21	1.73*b*	2.40	1.40	1.66	1.84	2.40
22	1.71	2.40	1.36	1.55	1.84	2.40
23	1.66	2.30	1.35	1.50	1.74	2.10
24	1.56	2.10	1.35	1.50	1.84	2.40
25	1.52	1.98	1.33	1.42	1.89	2.50
26	1.52	1.99	1.33	1.40	1.89	2.50
27	1.52	2.00	1.32	1.36	1.74	2.00
28	1.56	2.10	1.30	1.29	1.64	1.78
29	1.60	2.20	1.30	1 27	1.29	0.86
30	1.61	2.20	1.16*c*	0.93	1.27	0.81
31			1.18	0.95		

a Ice in creek, no observations obtained.
b Shifting conditions to end of year.
c D. H. Pollock turned water into ditch.

Daily Gauge-height and Discharge of Swiftcurrent Creek, at Pollock's Ranche, for 1913.—*Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.22	0.69	1.14	0.98	1.30	1.32	1.24	1.24
2	1.27	0.80	1.14	1.02	1.28	1.26	1.24	1.25
3	1.22	0.67	1.14	1.05	1.20	1.07	1.24	1.27
4	1.62	1.66	1.14	1.07	1.20	1.06	1.24	1.28
5	1 52	1.40	1.21	1.29	1.20	1.05	1.25	1.32
6	1.32	0.88	1.24	1.30	1.28	1.22	1.29	1.44
7	1.27	0.75	1.24	1.30	1.27	1.18	1.54	2.00
8	1.22	0.62	1.24	1.30	1.27	1.17	[illegible]	2.00
9	1.30*a*	0.80	1.23	1.27	1.38	1.41	1.41	1.73
10	1.39	1.01	1.24	1.29	1.28	1.17	1.39	1.70
11	1.42	1.12	1.24	1.28	1.23	1.05	1.35	1.62
12	1.30	0.85	1.24	1.28	1.18	0.93	1.31	1.54
13	1.70	1.91	1.28	1.39	1.18	0.92	1.30	1.53
14	1.40	1.15	1.32	1.46	1.20	0.95	1.23	1.38
15	1.30	0.94	1.32	1.46	1.22	0.99	1.35	1.64
16	1.28	0.90	1.32	1.45	1.22	1.00	1.35	1.62
17	1.28	0.93	1.74	2.40	1.23	1.04	1.36	1.61
18	1.28	0.96	1.64	2.20	1.26	1.10	1.36	1.59
19	1.28	0.99	1.42	1.66	1.24	1.07	1.36	1.57
20	1.26	0.97	1.31	1.41	1.24	1.08	1.36	1.54
21	1.26	0.99	1.30	1.38	1.24	1.10	1.36	1.52
22	1.25	1.00	1.20	1.15	1.36	1.38	1.37	1.51
23	1.24	1.00	1.20	1.15	1.22	1.08	1.04	0.73
24	1.24	1.02	1.19	1.12	1.22	1.10	1.04	0.70
25	1.23	1.02	1.17	1.07	1.22	1.11	1.38	1.46
26	1.22	1.03	1.12	0.95	1.22	1.13	1.39	1.45
27	1.20	1.00	1.14	1.00	1.23	1.17	1.42	1.51
28	1.18	0.99	1.14	0.99	1.24	1.20	1.43	1.50
29	1.18	1.01	1.12	0.93	1.24	1.22	1.43	1.48
30	1.15	0.97	1.16	1.02	1.24	1.23	1.44	1.48
31	1.15	0.99	1.40	1.55	.....	.....	1.46	1.50

a D. H. Pollock turned water out of ditch.

Monthly Discharge of Swiftcurrent Creek at Pollock's Ranche, for 1913.

(Drainage area, 16 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage. Acre.	Total in Acre-feet.
April	11.00	1.98	4.13	0.258	0.221	188
May	2.30	0.93	1.83	0.114	0.131	112
June	2.50	0.66	1.26	0.079	0.088	75
July	1.91	0.62	1.00	0.062	0.072	61
August	2.40	0.93	1.30	0.081	0.093	80
September	1.41	0.92	1.12	0.070	0.078	67
October	2.00	0.70	1.47	0.092	0.106	90
The period	.....	.....	.....	.....	0.789	673

JONES' CREEK AT READ'S RANCHE.

This station was established on September 23rd, 1909, by H. R. Carscallen. It is located on N.E. ¼ Sec. 5, Tp. 8, Rge. 20, W. 3rd Mer., about 300 yards from the surveyed trail from East End to Gull Lake and about 42 miles south of Gull Lake.

This station was abandoned on May 19th, 1912, as no observer could be obtained; another station was established about 6 miles upstream on N.E. ¼ Sec. 20, Tp. 8, Rge. 20, W. 3rd Mer.

Discharge Measurements of Jones' Creek at Read's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 21	J. S. Wright & E. W. W. Hughes.	12.5	18.82	0.528	2.86	9.94
May 15	E. W W. Hughes	13.0	19.97	0.242	2.79	4.83
June 7	do	13.9	11.60	0.068	2.25	0.79
July 10	do	3.8	1.52	0.651	2.04	a 0.99
Aug. 4	do					Nil..b...

a Measurement made half a mile upstream from gauge.
b Water standing in pools.

JONES' CREEK AT STEARN'S RANCHE.

This station was established on May 15, 1912, by J. S. Wright. It is located on S. E. ¼ Sec. 20, Tp. 8, Rge. 20, W. 3rd Mer. It is about 39 miles south of Gull Lake.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a post sunk in the bed of the stream and securely stayed to the left bank. The zero of the gauge (elev. 93.14) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank about 40 feet west of the gauge.

The channel is straight for 50 feet above and 25 feet below the station. The right bank is high and not liable to overflow. The left bank is low and liable to overflow. The banks are free from brush except for a little undergrowth on the left bank. The bed of the stream is composed of soft clay with sand underneath.

Discharge measurements are generally made by wading, a short distance downstream from the gauge, but at very low stages a weir is used. The initial point for soundings is a stake driven close to the ground on the right bank and marked "I.P".

During 1913 the gauge was read by Chas. E. Stearns.

Discharge Measurements of Jones' Creek at Stearn's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 21	E. W. W. Hughes	4.6	6.39	1.100	1.84	7.00
May 15	do	3.9	3.96	1.160	1.41	4.60
June 7	do	4.0	1.28	0.527	0.62	0.68
July 10	do	4.1	1.37	0.751	0.62	1.03
Aug. 4	do	3.4	0.83	0.265	0.48	0.22
Aug. 26	do	3.0	0.75	0.747	0.53	0.56
Oct. 14	do	4.0	1.25	0.552	0.59	0.69
Nov. 4	do	3.6	1.31	0.838	0.60	1.10

Daily Gauge-height and Discharge of Jones' Creek, at Stearn's Ranche, for 1913.

Day.	May.		June.		July.		August.		September.		October	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.55	5.40	0.73	1.16	0.67	1.06	0.48	0.26	0.54	0.57	0.55	0.60
2	*a*1.41	4.60	0.72	1.10	0.69	1.20	0.48	0.24	0.54	0.57	0.54	0.57
3	*a*1.27	3.80	0.72	1.08	0.67	1.12	0.44	0.16	*a*0.54	0.57	0.54	0.57
4	1.13	3.10	0.71	1.01	1.16	3.40	0.48	0.22	0.53	0.54	0.54	0.57
5	*a*1.12	3.00	0.71	0.98	*a*0.93	2.30	0.58	0.46	0.50	0.46	0.55	0.60
6	*a*1.11	3.00	*a*0.68	0.85	0.71	1.32	0.54	0.36	0.49	0.44	0.60	0.74
7	*a*1.10	2.90	0.66	0.68	0.72	1.36	0.54	0.39	0.49	0.44	0.62	0.80
8	*a*1.09	2.90	0.65	0.70	0.67	1.22	0.53	0.36	0.49	0.44	0.61	0.77
9	*a*1.08	2.80	0.63	0.64	0.65	1.14	0.53	0.40	0.49	0.44	*a*0.60	0.74
10	1.07	2.80	0.61	0.60	0.62	1.03	0.52	0.37	0.54	0.57	0.60	0.74
11	*a*1.05	2.70	0.61	0.63	0.62	1.02	0.52	0.38	0.52	0.52	0.59	0.72
12	*a*1.03	2.60	0.69	0.87	0.62	1.00	0.51	0.36	0.53	0.54	0.59	0.72
13	1.02	2.50	0.63	0.69	0.99	2.60	0.53	0.44	0.53	0.54	0.58	0.68
14	1.46	4.90	0.64	0.76	0.76	1.52	0.62	0.66	0.52	0.52	0.58	0.68
15	1.41	4.60	0.60	0.64	*a*0.69	1.20	0.62	0.69	0.52	0.52	*a*0.58	0.67
16	*a*1.24	3.60	0.58	0.59	0.63	0.98	*a*0.58	0.58	0.52	0.52	*a*0.58	0.68
17	1.07	2.80	0.56	0.57	0.63	0.96	0.54	0.50	0.52	0.52	0.58	0.70
18	1.06	2.70	0.67	0.89	0.62	0.92	0.89	1.74	0.52	0.52	0.58	0.72
19	1.05	2.70	0.62	0.74	0.61	0.86	*a*0.74	1.14	0.58	0.68	*a*0.58	0.74
20	1.03	2.60	2.23	9.30	0.58	0.75	0.59	0.66	0.55	0.60	*a*0.58	0.76
21	1.00	2.40	0.82	1.51	0.57	0.70	0.53	0.52	*a*0.58	0.68	0.58	0.78
22	0.97	2.30	0.87	1.72	0.56	0.66	*a*0.52	0.50	0.60	0.74	0.58	0.80
23	0.96	2.20	0.87	1.79	0.56	0.63	0.51	0.50	0.67	0.97	0.58	0.81
24	0.92	2.00	0.81	1.52	0.53	0.54	0.51	0.50	0.59	0.72	0.58	0.83
25	0.90	1.92	0.81	1.52	0.63	0.80	0.50	0.48	0.58	0.68	0.58	0.84
26	0.87	1.79	0.80	1.54	0.54	0.52	0.49	0.46	0.57	0.65	*a*0.59	0.90
27	0.82	1.56	*a*0.75	1.32	0.53	0.48	*a*0.51	0.49	0.57	0.65	*a*0.60	0.95
28	0.81	1.52	0.70	1.13	0.50	0.38	0.53	0.54	0.56	0.62	*a*0.61	0.99
29	0.80	1.48	0.68	1.12	0.50	0.36	0.53	0.54	0.55	0.60	*a*0.62	1.03
30	0.77	1.34	0.68	1.12	0.50	0.34	0.63	0.83	0.55	0.60	0.64	1.12
31	0.73	1.18	.....	.....	*a*0.49	0.30	0.59	0.72	.....	.....	*a*0.64	1.14

a Gauge heights interpolated.

Monthly Discharge of Jones' Creek at Stearn's Ranche, for 1913.

(Drainage area, 23 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage. Area.	Total in Acre-feet.
May	5.40	1.18	2.760	0.120	0.14	170
June	9.30	0.57	1.290	0.056	0.06	77
July	3.40	0.30	1.050	0.046	0.05	65
August	1.74	0.16	0.531	0.023	0.03	33
September	0.97	0.44	0.581	0.025	0.03	35
October	1.14	0.57	0.773	0.034	0.04	48
The period	.....	.....	.....	.....	0.35	428

SWIFTCURRENT CREEK AT SINCLAIR'S RANCHE. (UPPER STATION.)

This station was established June 15, 1910, by R. G. Swan. It is located on the S.E. ¼ Sec. 18, Tp. 10, Rge. 19, W. 3rd Mer., about 150 feet upstream from the mouth of Bone Creek, and about 1200 feet above the lower station.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the right bank. The zero (elev. 87.86) is referred to a permanent iron bench mark (assumed elev. 100.00), located 300 feet S. 64.5° W. of the gauge.

The channel is straight for about 250 feet above and 150 feet below the station. Both banks are fairly high and covered with a growth of brush. Neither bank will overflow. The bed of the stream is composed of sand which will shift.

Discharge measurements are made at the station by wading. The initial point for soundings is a plug on the left bank, about four inches above ground and 45 feet from the gauge. During high stages the gauge heights at this station are affected by backwater from Bone Creek.

During 1913 the gauge was read by Mrs. K. Sinclair.

DISCHARGE MEASUREMENTS of Swiftcurrent Creek at Sinclair's Ranche, (Upper Station), in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 22	J. S. Wright & E. W. W. Hughes.	13.3	16.1	1.09	1.74	17.60
May 14	E. W. W. Hughes	12.3	7.0	1.63	0.86	11.40
June 6	do	10.5	2.8	1.13	.54	3.20
July 11	do	10.5	3.6	0.86	.57	3.10
Aug. 5	do	.....	.....	.....	.27	a 0.19
Oct. 15	do	10.5	3.1	0.84	.60	2.60
Nov. 5	do	.....	.....	.....	0.57	.....b...

a Weir measurement.
b Too much ice to make measurement.

DAILY GAUGE-HEIGHT AND DISCHARGE of Swiftcurrent Creek, at Sinclair's Ranche (Upper station, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.14	15.0	0.62	3.40
2	5.74	.....a	1.14	15.0	0.59	3.80
3	5.99	.....	1.16	16.0	0.57	2.50
4	6.04	.....	1.16	16.0	0.56	2.40
5	6.34	.....	1.18	17.0	0.59	3.80
6	6.54	.....	1.16	16.0	0.56	2.40
7	6.74	.....a	1.11	12.0	0.53	1.94
8	6.91	252.0	1.05	11.0	0.51	1.68
9	6.24	221.0	1.01	10.0	0.49	1.46
10	5.99	208.0	0.97	10.0	0.46	1.19
11	5.24	175.0	0.95	11.0	0.48	1.37
12	5.69	195.0	0.95	12 0	0.47	1.28
13	5.24	175.0	0.86	13.0	0.48	1.37
14	5.01	166.0	0.96	15.0	0.49	1.46
15	4.74	152.0	0.98	15.6	0.51	1.68
16	4.24	130.0	0.94	14.90	0.54	2.10
17	3.89	114.0	0.93	14.40	0.53	1.94
18	3.89	114.0	0.92	14.00	0.54	2.10
19	3.79	109.0	0.88	12.3	0.56	2.40
20	2.34	48.0	0.88	12.3	1.09	22.00
21	2.14	35.0	0.86	11.5	1.10	22.00
22	1.74	17.1	0.84	10.6	1.24	28.00
23	1.49	16 5	0.79	8.6	1.25	29 00
24	1.21	16.0	0.76	7.5	1.23	28.00
25	1.15	15.0	0.73	6.4	1.06	20 30
26	1.11	14 0	0.73	6.4	1.01	18 00
27	1.06	13.0	0.71	5.8	0.89	12 70
28	1.02	12.0	0.69	5.2	0.81	9 40
29	1.01	11.0	0.67	4.6	0.76	7 50
30	1.20	16.0	0.65	4.1	0.73	6 40
31	.....	.....	0.64	3.9	.....	

a Ice conditions to April 7.

DAILY GAUGE-HEIGHT AND DISCHARGE of Swiftcurrent Creek, at Sinclair's Ranche (Upper station), for 1913.

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.70	5.40	0.31	0.34	0.38	0.65	52	1.81
2	0.69	5.10	0.29	0.27	0.39	0.70	54	2.10
3	0.69	5.10	0.28	0.24	0.39	0.70	55	2.20
4	0.70	5.40	0.26	0.18	0.38	0.65	55	2.20
5	0.74	6.80	0.28	0.24	0.35	0.50	55	2.20
6	0.71	5.80	*b*		0.32	0.34	0.46	59	3.80
7	0.71	5.80	.....		0.40	0.30	0.30	63	3.70
8	0.67	4.60	.....		0.48	0.29	0.27	60	3.00
9	0.65	4.10	.....		0.56	0.29	0.27	60	3.00
10	0.61	3.20	.....		0.64	0.29	0.27	57	2.50
11	0.57	2.50	.....		0.72	0.30	0.30	59	3.80
12	0.59	3.80	.....		0.80	0.29	0.27	60	3.00
13	0.58	2.70	.....		0.88	0.29	0.27	60	3.00
14	0.69	5.10	.....		0.96	0.28	0.24	60	3.00
15	0.64	3.90	.....		1.04	0.27	0.21	60	3.00
16	0.61	3.20	.....		1.12	0.28	0.24	58	2.70
17	0.56	2.40	.....		1.20	0.30	0.30	59	2.80
18	0.53	1.94	0.45*b*		1.28	0.30	0.30	59	2.80
19	0.51	1.68	0.48		1.37	0.30	0.30	60	3.00
20	0.46	2.40	0.52		1.81	0.29	0.27	62	3.40
21	0.43	0.96	0.53		1.94	0.30	0.30	65	4.10
22	0.42	0.89	0.57		2.50	0.45	1.10	65	4.10
23	0.40	0.75	0.55		2.20	0.59	3.80	66	4.40
24	0.40	0.75	0.53		1.94	0.58	2.70	70	5.40
25	0.39	0.70	0.48		1.37	0.57	2.50	72	6.10
26	0.37	0.60	0.43		0.96	0.50	1.55	78	8.20
27	0.36	0.55	0.40		0.75	0.52	1.81	75	7.10
28	0.35	0.50	0.44		1.03	0.54	2.10	60	3.00
29	0.35	0.50	0.41		0.83	0.53	1.94	55	2.20
30	0.33	0.42	0.39		0.70	0.57	2.50	52	1.81
31	0.33	0.42	0.39		0.70	.....	.....	55	2.20

b Observations useless, discharges are estimates only.

MONTHLY DISCHARGE of Swiftcurrent Creek at Sinclair's Ranche, (Upper Station), for 1913.

(Drainage area, 149 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (8-30)	252.00	11.00	96.700	0.649	0.55	4,411
May	17.00	3.90	12.040	0.081	0.09	740
June	29.00	1.19	8.120	0.054	0.06	483
July	6.80	0.42	2.840	0.019	0.02	175
August	2.50	0.18	0.960	0.006	0.01	59
September	3.80	0.21	0.994	0.007	0.01	59
October	8.20	1.81	3.410	0.023	0.03	210
The period					0.77	6,137

BONE CREEK AT LEWIS' RANCHE.

This station was established July 2, 1908, by F. T. Fletcher. It is located at the highway bridge on the N.W. ¼ Sec. 34, Tp. 8, Rge. 22, W. 3rd Mer. It is on the surveyed trail from Skull Creek P.O. to East End P.O., and is about fifteen miles south of Skull Creek P.O. by trail. The bridge is a small wooden structure, built in the form of a culvert with a rectangular cross-section.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to the left abutment on the upstream side of the bridge. The zero of the gauge (elev. 95.02) is

referred to a permanent iron bench mark (assumed elev. 100.00), sunk in the right bank, about 62 feet southwest of the gauge.

The channel is straight for 50 feet above the station; below the station it curves gradually to the left after emerging from the downstream side of the bridge. The right bank is high and will not overflow; the left bank is comparatively low, but no indication of the water overflowing the bank can be found. Both banks are free from brush at the station. The bed of the stream is sandy with some large stones scattered along the cross-section. The current is moderate, becoming very swift below the station.

At high stages discharge measurements are made from the upstream side of the bridge. The initial point for soundings is the inner face of the left abutment. Low-water measurements are made near the station by wading.

During 1913 the gauge was read by C. L. Lewis.

Discharge Measurements of Bone Creek at Lewis' Ranche, in 1913.

Date	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 26	J. S. Wright & E. W. W. Hughes.	4.5	2.09	0.852	0.24	1.78
May 8	E. W. W. Hughes	9.1	3.49	.834	.23	2.90
June 17	do	9.2	2.48	.552	.13	1.37
July 16	do	9.4	2.96	.260	.13	0.77
Aug. 20	do	5.0	1.79	.759	.13	1.36
Sept. 12	do	4.8	1.41	.745	.10	1.05
Oct. 11	do	5.9	1.55	.813	.17	1.26
Nov. 1	do	5.5	2.03	0.871	.19	1.77

Daily Gauge-height and Discharge of Bone Creek, at Lewis' Ranche, for 1913.

Day.	March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			0.30	.....	0.25	2.5	0.21	2.60
2			0.35	.....	0.28	3.1	0.21	2.60
3			0.36*a*	.....	0.25	2.7	0.20	2.40
4			1.50	30.00	0.26	3.0	0.20	2.40
5			2.25	46.00	0.25	2.9	0.19	2.30
6			2.12	43.00	0.25	3.0	0.19	2.20
7			2.09	43.00	0.26	3.3	0.19	2.20
8			1.65	33.00	0.23	2.9	0.19	2.20
9			1.32	26.00	0.23	2.9	0.18	2.10
10			1.48	29.00	0.23	2.9	0.18	2.10
11			1.73	35.00	0.22	2.8	0.16	1.78
12			1.77	36.00	0.22	2.8	0.17	1.90
13			1.51	30.00	0.22	2.8	0.17	1.88
14			0.95	17.60	0.23	2.9	0.15	1.64
15			0.94	17.40	0.23	2.9	0.15	1.63
16			0.60	9.90	0.23	2.9	0.15	1.62
17			0.50	7.70	0.23	2.9	0.22	2.60
18			0.25*b*	1.92	0.23	2.9	0.21	2.40
19			0.24	1.78	0.23	2.9	0.22	2.50
20			0.23	1.66	0.23	2.9	0.21	2.30
21	0.17*a*	.....	0.23	1.66	0.22	2.8	0.20	2.20
22	0.17	.....	0.21	1.42	0.22	2.8	0.20	2.10
23	0.17	.....	0.21	1.42	0.22	2.8	0.20	2.10
24	0.17	.....	0.21	1.42	0.22	2.8	0.21	2.20
25	0.15	.....	0.22	1.54	0.22	2.8	0.21	2.20
26	0.11	.....	0.24	1.78	0.22	2.8	0.21	2.20
27	0.12	.....	0.25	2.00	0.21	2.6	0.22	2.30
28	0.13	.....	0.25	2.10	0.21	2.6	0.24	2.60
29	0.14	.....	0.25	2.20	0.21	2.6	0.21	2.10
30	0.14	.....	0.25	2.40	0.21	2.6	0.20	1.98
31	0.16	.....	.....	.....	0.21	2.6	.....	.....

a Ice conditions, not sufficient data to compute discharge.
b Shifting conditions to end of year.

DAILY GAUGE-HEIGHT AND DISCHARGE of Bone Creek, at Lewis' Ranche, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.22	2.20	0.12	0.92	1.10	1.05	0.16	1.34
2	0.22	2.20	0.12	0.94	0.10	1.05	0.16	1.32
3	0.23	2.30	0.13	1.06	0.10	1.05	0.16	1.30
4	0.23	2.20	0.12	0.99	0.10	1.05	0.16	1.28
5	0.23	2.20	0.12	1.01	0.10	1.05	0.16	1.26
6	0.22	2.00	0.13	1.14	0.10	1.05	0.16	1.24
7	0.21	1.86	0.13	1.17	0.10	1.05	0.18	1.45
8	0.21	1.84	0.13	1.19	0.10	1.05	0.18	1.44
9	0.21	1.82	0.13	1.20	0.10	1.05	0.17	1.30
10	0.21	1.80	0.13	1.21	0.10	1.05	0.17	1.28
11	0.22	1.92	0.12	1.10	0.10	1.05	0.17	1.26
12	0.22	1.86	0.11	1.02	0.10	1.05	0.17	1.28
13	0.25	2.30	0.11	1.04	0.10	1.03	0.17	1.30
14	0.19	1.45	0.12	1.16	0.11	1.12	0.17	1.32
15	0.15	1.00	0.12	1.18	0.11	1.10	0.17	1.33
16	0.13	0.77	0.12	1.20	0.11	1.09	0.17	1.34
17	0.13	0.78	0.12	1.21	0.11	1.07	0.17	1.35
18	0.13	0.79	0.12	1.23	0.11	1.05	0.17	1.36
19	0.13	0.80	0.12	1.24	0.11	1.03	0.17	1.37
20	0.13	0.82	0.11	1.16	0.11	1.01	0.18	1.48
21	0.12	0.75	0.11	1.17	0.11	0.99	0.18	1.51
22	0.12	0.76	0.11	1.17	0.12	1.08	0.18	1.53
23	2.12	0.78	0.11	1.17	0.16	1.50	0.18	1.55
24	0.12	0.80	0.11	1.17	0.22	2.30	0.18	1.56
25	0.13	0.90	0.11	1.17	0.29	3.40	0.18	1.57
26	0.13	0.92	0.11	1.17	0.16	1.44	0.19	1.72
27	0.13	0.94	0.10	1.05	0.16	1.42	0.19	1.73
28	0.12	0.86	0.10	1.05	0.16	1.40	0.19	1.74
29	0.12	0.88	0.10	1.05	0.16	1.38	0.19	1.75
30	0.12	0.89	0.10	1.05	0.16	1.36	0.19	1.76
31	0.12	0.90	0.10	1.05	.....	.....	0.11	1.77

MONTHLY DISCHARGE of Bone Creek at Lewis' Ranche, for 1913.

(Drainage area, 17 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	46.00	1.42	15.80	0.929	0.933	847
May	3.30	2.50	2.83	0.166	0.191	174
June	2.60	1.62	2.18	0.128	0.143	130
July	2.30	0.75	1.36	0.080	0.092	84
August	1.24	0.92	1.12	0.066	0.076	69
September	3.40	0.99	1.24	0.073	0.081	74
October	1.77	1.24	1.44	0.085	0.098	88
The period					1.614	1,466

SWIFTCURRENT CREEK AT SINCLAIR'S RANCHE. (LOWER STATION.)

This station was established on May 27, 1910, by H. R. Carscallen. It is located on the S.W. ¼ Sec. 17, Tp. 10, Rge. 19, W. 3rd Mer., at the highway bridge on the surveyed trail from East End to Gull Lake, and just below the mouth of Bone Creek.

The gauge is of the standard chain type. The box is nailed securely to the downstream side of the floor of the bridge. The length of chain from bottom of weight to marker is 20.65 feet. The zero (elev. 85.73) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank 600 feet upstream from the bridge.

The channel is straight for 75 feet above and 20 feet below the station. The left bank has a gradual slope, is high and well wooded. The right bank rises abruptly; it is also high and well wooded. The stream bed is sandy in character, free from vegetation and liable to shift at high water. The current at this point is sluggish.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the inner face of the left abutment. Low water measurements are made by wading at a point about 100 feet upstream.

During 1913, the gauge was read by Mrs. K. Sinclair.

DISCHARGE MEASUREMENTS of Swiftcurrent Creek at Sinclair's Ranche, (Lower Station), in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean. Velocity.	Gauge Height.	Discharge
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 22	J. S. Wright & E. W. W. Hughes.	35.6	51.8	1.18	3.50	61.0
May 14	E. W. W. Hughes	16.7	32.7	0.98	2.49	32.0
June 6	do	29.5	17.1	0.90	2.00	15.3
July 7	do	19.3	13.3	1.05	1.88	14.0
Aug. 5	do	17.0	5.7	0.66	1.38	3.8
Aug. 26	do	14.0	7.3	0.66	1.29	4.8
Sept. 16	do	14.5	5.6	0.82	1.37	4.6
Oct. 15	do	27.9	13.8	0.76	1.84	10.5
Nov. 5	do	27.9	14.0	0.77	1.79	10.7

DAILY GAUGE-HEIGHT AND DISCHARGE of Swiftcurrent Creek, at Sinclair's Ranche (Lower station), for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.87	41	2.15	19.1
2			2.78	38	2.12	18.3
3			2.75	37	2.10	17.7
4	*a*		2.82	39	2.10	17.7
5	*b*		2.85	40	2.09	17.4
6			2.84	40	2.00	15.2
7			2.75	37	2.04	16.2
8			2.67	34	2.01	15.4
9			2.65	34	1.97	14.5
10	8.90	2.34*c*	2.62	33	1.97	14.5
11	*b*		2.60	32	1.87	12.3
12			2.60	32	1.82	11.3
13			2.49	29	1.79	10.7
14			2.60	32	1.75	10.0
15			2.62	33	1.77	10.4
16			2.63	33	1.80	10.9
17			2.65	34	1.87	12.3
18			2.63	33	1.95	14.0
19			2.61	33	1.95	15.0
20			2.59	32	2.75	37.0
21			2.55	31	2.79	38.0
22	3.50	61	2.47	28	2.95	44.0
23	3.10	48	2.39	26	2.97	44.0
24	2.95	41	2.33	24	3.00	45.0
25	2.60	32	2.20	20	2.89	42.0
26	2.65	34	2.21	21	2.67	34.0
27	2.70	36	2.19	20	2.51	30.0
28	2.60	32	2.25	22	2.42	27.0
29	2.70	36	2.24	22	2.29	23.0
30	2.85	40	2.22	21	2.15	19.1
31			2.25	22		

a Ice went out of creek.
b Chain gauge broken, no observations made.
c Estimated highest discharge.

DAILY GAUGE-HEIGHT AND DISCHARGE of Swiftcurrent Creek, at Sinclair's Ranche (Lower station), for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.00	15.2	1.32	4.1	1.45	5.5	1.67	8.6
2	2.10	17.7	1.30	3.9	1.42	5.1	1.77	10.4
3	2.08	17.2	1.27	3.6	1.39	4.8	1.80	10.9
4	2.04	16.2	1.32	4.1	1.35	4.4	1.83	11.5
5	2.25	22.0	1.38	4.7	1.34	4.3	1.85	11.9
6	2.27	22.0	1.38	4.7	1.32	4.1	1.88	12.5
7	2.20	20.0	1.35	4.4	1.35	4.4	2.05	16.4
8	1.95	14.0	1.40	4.9	1.35	4.4	2.11	18.0
9	1.94	13.8	1.47	5.7	1.39	4.8	2.25	22.0
10	1.85	11.9	1.52	6.4	1.39	4.8	2.00	15.2
11	1.88	12.5	1.47	5.7	1.41	5.0	1.96	14.2
12	1.92	13.3	1.43	5.3	1.41	5.0	1.80	10.9
13	1.90	12.9	1.43	5.3	1.40	4.9	1.86	12.1
14	2.03	15.9	1.40	4.9	1.42	5.1	1.84	11.7
15	2.00	15.2	1.39	4.8	1.44	5.4	1.89	12.7
16	1.99	15.0	1.32	4.1	1.45	5.5	1.92	13.3
17	1.87	12.3	1.45	5.5	1.45	5.5	1.90	12.9
18	1.80	10.9	1.49	6.0	1.47	5.7	1.87	12.3
19	1.75	10.0	1.52	6.4	1.48	5.9	1.86	12.1
20	1.62	7.8	1.55	6.8	1.48	5.9	1.85	11.9
21	1.55	6.8	1.60	7.5	1.52	6.4	1.87	12.3
22	1.55	6.8	1.52	6.4	*a*2.00	15.2	1.90	12.9
23	1.56	6.[illegible]	1.49	6.0	2.15	19.1	1.92	13.3
24	1.55	6.8	1.46	5.6	2.13	18.5	1.95	14.0
25	1.52	6.4	1.40	4.9	2.08	17.2	1.95	14.0
26	1.50	6.1	1.36	4.5	2.03	15.9	2.00	15.2
27	1.57	7.1	1.35	4.4	1.94	13.8	1.97	14.5
28	1.47	5.7	1.29	3.8	1.80	10.9	1.85	11.9
29	1.42	5.1	1.38	4.7	1.80	10.9	1.85	11.9
30	1.40	4.9	1.41	5.0	1.78	10.5	1.80	10.9
31	1.39	4.8	1.43	5.3	.....	.....	1.89	12.7

a Gauge height interpolated.

MONTHLY DISCHARGE of Swiftcurrent Creek at Sinclair's Ranche, (Lower Station), for 1913

(Drainage area, 366 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage. Area.	Total in Acre-feet
April (22-30)	234.0	32.0	40.3	0.110	0.037	720
May	41.0	20.0	30.7	0.083	0.096	1,888
June	45.0	10.0	21.9	0.060	0.067	1,303
July	22.0	4.8	11.7	0.032	0.037	719
August	7.5	3.6	5.1	0.014	0.016	314
September	19.1	4.1	8.0	0.022	0.024	476
October	22.0	8.6	13.1	0.036	0.042	806
The period					0.319	6,226

SWIFTCURRENT CREEK NEAR SWIFT CURRENT.

This station was established on May 5, 1913, by O. H. Hoover, to obtain the flow of the creek above the intake of the town of Swift Current's water supply. It is located on the N. W. ¼ Sec. 18, Tp. 15 Rge. 13, W. 3rd Mer., and about 2 miles from the centre of the town of Swift Current.

The gauge, which is a plain staff graduated to feet and hundredths, is located on the right bank. The zero (elev. 87.20) is referred to a bench mark (assumed elev. 100.00) on a rock about 20 feet from the gauge.

The channel is straight for 1200 feet above and 150 feet below the station. The right bank is high; the left is low but not liable to overflow. The bed of the stream is of sand and gravel, while the current is sluggish; there is no growth of vegetation in the channel.

Discharge measurements are made at the gauge with a current meter by wading. There is a bridge a short distance downstream, from which measurements can be made at high water and flood periods.

The gauge was read during 1913 by Mrs. C. E. Downes and Stanley Tite.

The reservoir dam of the town of Swift Current was constructed a short distance above the gauge and therefore this station will not in future include the full discharge of the stream.

DISCHARGE MEASUREMENTS of Swiftcurrent Creek near Swift Current, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 6	O. H. Hoover	53.5	11.3	0.725	1.56	81.60
May 30	do	53.2	9.5	0.45	1.30	43.20
July 5	do	53.1	10.7	0.59	1.45	63.30
July 28	do	30.5	31.8	0.44	1.00	14.10
Aug. 27	do	30.5	29.9	0.39	0.91	11.60
Sept. 27	do	32.3	33.1	0.49	1.03	16.20
Oct. 21	do	34.2	33.1	0.55	1.12	18.20
Nov. 15	do	30.8	36.6	0.66	1.18	24.00
Dec. 8	do	27.0	24.6	0.45	0.95	11.00
Dec. 27	F. R. Steinberger				1.26	a 0.22

a Weir measurement.

DAILY GAUGE-HEIGHT AND DISCHARGE of Swiftcurrent Creek, near Swift Current, for 1913.

Day.	May.		June.		July.		August.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			1.55	80	1.63	96.0	0.97	14.5
2			1.56	82	1.61	92.0	0.97	14.4
3			1.54	78	1.63	96.0	0.96	13.7
4			1.55	80	1.50*a*	71.0	0.96	13.6
5			1.56	82	1.45	63.0	0.97*a*	14.0
6	1.55	80	1.58	86	1.45	63.0	0.98*a*	14.5
7	1.57	84	1.57	84	1.41	57.0	0.99*a*	15.0
8	1.56	82	1.51	73	1.41	57.0	1.00*a*	15.6
9	1.56*a*	82	1.28	41	1.41	57.0	1.00	15.6
10	1.55	80	1.26	39	1.41	57.0	1.02	16.7
11	1.55	80	1.23	35	1.41	57.0	1.00	15.4
12	1.54	78	1.24	36	1.41	57.0	0.84	7.6
13	1.55	80	1.23	35	1.39	55.0	0.84	7.6
14	1.55	80	1.22	34	1.36	50.0	0.98	13.8
15	1.54	78	1.26	39	1.36	50.0	0.98	14.0
16	1.56	82	1.28	41	1.36	50.0	0.92	10.8
17	1.56	82	1.28	41	1.32	45.0	0.98	13.6
18	1.54	78	1.26	39	1.32	45.0	0.97*a*	12.8
19	1.58	86	1.21	33	1.32	45.0	0.96*a*	12.3
20	1.55	80	1.22	34	1.27	40.0	0.95*a*	11.9
21	1.56	82	1.41	57	1.22	34.0	0.94*a*	11.5
22	1.58	86	1.42	59	1.22	34.0	0.93*a*	11.1
23	1.58	86	1.51	73	1.22	34.0	0.92*a*	10.6
24	1.58*a*	86	1.70*a*	110	1.20	32.0	0.91*a*	10.2
25	1.58*a*	86	1.68*a*	106	1.20	32.0	0.90*a*	9.8
26	1.58*a*	86	1.67	104	1.20	32.0	0.89*a*	9.4
27	1.58*a*	86	1.69	108	1.20	32.0	0.88	9.0
28	1.58	86	1.66	102	1.00	16.6	0.87	8.5
29	1.56	82	1.65	100	1.00	16.4	0.86	8.1
30	1.55	80	1.65	100	1.00	16.3	0.87	8.5
31	1.58	86			0.98	15.0	0.86	8.1

a Gauge height interpolated.

Daily Gauge-height and Discharge of Swiftcurrent Creek, near Swift Current, for 1913. —*Concluded.*

Day.	September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.87	8.5	1.03	15.5	.....*a*	.....	1.14	20.70
2	0.86	8.1	1.03	15.5	.....	.....	1.06	16.90
3	0.81	6.1	1.02	15.0	.....	.....	1.13	20.20
4	0.82	6.5	1.03	15.5	.....	.....	1.06	16.90
5	0.82	6.5	1.04	15.9	.....	.....	1.10	18.80
6	0.81	6.1	1.03	15.5	.....	.....	1.14	20.70
7	0.81	6.1	1.03	15.5	.....	.....	0.97	12.80
8	0.77	4.6	1.03	15.5	.....	.....	0.95	11.90
9	0.77	4.6	1.02	15.0	.....	.....	1.00	14.10
10	0.77	4.6	1.01	14.5	.....	.....	1.00	14.10
11	0.72	2.9	1.02	15.0	.....	.....	1.04	15.90
12	0.77	4.6	1.01	14.5	.....	.....	1.03	15.50
13	0.77	4.6	1.01	14.5	.....	.....	1.00	14.10
14	0.77	4.6	1.03	15.5	.....	.....	1.01	14.60
15	0.77	4.6	1.04	15.9	1.18*a*	22.7	1.00	14.60
16	0.78	5.0	1.03	15.5	1.23	25.3	1.00	14.10
17	0.78	5.0	1.02	15.0	1.20	23.7	1.07	17.40
18	0.78	5.0	1.02	15.0	0.99	13.7	1.04	15.90
19	0.73	3.2	1.03	15.5	0.99	13.7	1.01	14.60
20	0.82	6.5	1.13	20.2	1.14	20.7	1.01	14.60
21	0.82	6.5	1.12	19.8	1.12	19.8	0.95	11.90
22	0.83	6.9	1.09	18.3	1.11	19.3	0.41*b*	0.40
23	0.83	6.9	1.08	17.8	1.20	23.7	0.38	0.30
24	0.92	10.6	1.07	17.4	1.10	18.8	1.33	0.25
25	0.96	12.3	1.07	17.4	1.14	20.7	1.03	0.25
26	0.99	13.7	1.11	19.3	1.14	20.7	1.03	0.25
27	1.03	15.5	1.14	20.7	1.16	21.7	1.25	0.20
28	1.04	15.9	1.19	23.2	1.16	21.7	1.30	0.25
29	1.04	15.9	1.09	18.3	1.16	21.7	1.10	0.50
30	1.04	15.9	1.10	18.8	1.13	20.2	1.29	0.75
31	.....	.....	1.10	18.8	.....	.....	1.34	1.00

a No records made.
b City began to fill reservoir above station.

Monthly Discharge of Swiftcurrent Creek near Swift Current, for 1913.

(Drainage area, 1,000 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage. Area.	Total in Acre-feet.
May (6-31)	86.0	78.0	82.5	0.082	0.079	4,255
June	110.0	33.0	67.0	0.067	0.075	3,987
July	96.0	15.0	48.3	0.048	0.055	2,970
August	16.7	7.6	12.0	0.012	0.014	738
September	15.9	2.9	7.6	0.076	0.085	452
October	23.2	14.5	16.8	0.017	0.020	1,033
November (15-30)	25.3	13.7	20.5	0.020	0.012	651
December	20.7	0.2	11.0	0.011	0.013	674
The period	.....	.....	.....	.....	0.353	14,760

SWIFTCURRENT CREEK AT SWIFT CURRENT.

This station was established April 30, 1910, by H. R. Carscallen. It is located at the traffic bridge on the north side of the Canadian Pacific Railway tracks in the town of Swift Current on S.W. ¼ Sec. 30, Tp. 15, Rge. 13, W. 3rd Mer.

The gauge is a plain staff, graduated to feet and hundredths, spiked vertically to the inside face of the left abutment of the bridge. The zero of the gauge (elev. 85.71) is referred to a permanent iron bench mark (assumed elev. 100.00), situated eight feet east of the south approach of the bridge.

The channel curves slightly, but is almost straight for about 300 feet above the station and is straight for about 300 feet below. The right bank is rather low with a gradual slope; the left bank is high. Both banks are clear of brush and undergrowth and are not liable to overflow. The bed of the stream is sandy with a few large stones and is liable to shift at high stages. Weeds in the cross-section make it difficult to make discharge measurements during the low stages of the stream, when the current is sluggish.

During ordinary stages, discharge measurements are made from the downstream side of the bridge, but at low stages they are made by wading near the bridge. The initial point for soundings is the inner face of the row of piles at end of the south approach.

During 1913, the gauge was read by C. E. Wesley, who lives within 200 yards of the bridge.

DISCHARGE MEASUREMENTS of Swiftcurrent Creek at Swift Current, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 21	O. H. Hoover	20.0	4.25			Nil.
Feb. 15	do					Nil.
Mar. 25	do	75.0	13.40	0.96	3.21	12.9
April 9	do	77.2	359.00	1.65	5.06	591.0
May 3	do	69.5	107.00	0.78	1.91	84.0
May 30	do	53.5	52.60	0.74	1.56	39.0
July 5	do	63.5	64.80	0.91	1.77	59.0
July 28	do	45.0	33.20	0.41	1.27	13.7
Aug. 27	do	44.0	31.60	0.36	1.24	11.2
Spet. 27	do	45.5	33.90	0.40	1.29	13.7
Oct. 21	do	51.0	39.90	0.51	1.36	20.0
Nov. 15	do	64.0	53.00	0.79	1.69	42.0

Daily Gauge-height and Discharge of Swiftcurrent Creek, at Swift Current, for 1913.

Day.	January.		February.		March.		April.		May.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge	Gauge Height.	Discharge.	Gauge Height	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.75	a	0.15	.....	.....	.....	c	.....	1.58	42
2	0.75	.....	0.15	.....	.....	.....	.....	.....	1.60	44
3	0.75	.....	0.15	.....	.....	.....	.....	.....	1.89	77
4	0.75	.....	0.15	.....	.....	.....	.....	.....	1.89	77
5	0.75	.....	0.15	.....	.....	.....	.....	.....	1.90	78
6	0.65	.....	0.15	.....	2.75	a	.....	.....	1.86	73
7	0.65	.....	0.05	.....	3.05	.....	.....	.....	1.84	71
8	0.65	.....	0.05	b	4.05	.....	c	.....	1.76	62
9	0.55	.....	.....	.....	4.55	.....	5.17	607	1.72	57
10	0.55	.....	.....	.....	4.65	.....	4.64	511	1.72	57
11	0.55	.....	.....	.....	4.75	.....	4.07	409	1.75	61
12	0.40	.....	.....	.....	4.55	.....	3.90	378	1.74	59
13	0.40	.....	.....	.....	4.55	.....	3.41	295	1.71	56
14	0.40	.....	.....	.....	4.55	.....	3.55	318	1.71	56
15	0.40	.....	.....	.....	4.35	.....	3.22	262	1.71	56
16	0.40	.....	.....	.....	4.25	.....	3.14	249	1.71	56
17	0.35	.....	.....	.....	4.15	.....	2.98	224	1.71	56
18	0.35	.....	.....	.....	4.05	.....	2.93	216	1.70	55
19	0.35	.....	.....	.....	3.75	.....	2.25	120	1.70	55
20	0.35	a	.....	.....	3.55	.....	2.10	102	1.68	53
21	0.15	b	.....	.....	3.15	.....	1.97	86	1.68	53
22	0.15	.....	.....	.....	3.15	.....	1.94	83	1.68	53
23	0.15	.....	.....	.....	3.15	.....	1.84	71	1.64	48
24	0.15	.....	.....	.....	3.15	.....	1.74	59	1.65	50
25	0.15	.....	.....	.....	3.16	.....	1.67	52	1.63	47
26	0.15	.....	.....	.....	3.16	.....	1.61	45	1.64	48
27	0.15	.....	.....	.....	3.16	.....	1.60	44	1.62	46
28	0.15	.....	.....	.....	3.16	.....	1.51	35	1.63	47
29	0.15	.....	.....	.....	3.16	.....	1.56	40	1.62	46
30	0.15	.....	.....	.....	4.36	.....	1.60	44	1.55	39
31	0.15	.....	.....	.....	5.66	a	.....	.....	1.56	40

a Ice conditions; not sufficient data to compute discharge.
b No flow; stream frozen solid.
c Gauge destroyed.

DAILY GAUGE-HEIGHT AND DISCHARGE of Swiftcurrent Creek, at Swift Current, for 1913. —*Concluded.*

DAY.	June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1 49	33	1 82	68 0	1 21	7.8	1.18	6 2	1 27	12.6
2	1.50	34	1 72	57 0	1.20	7.0	1.11	3.4	1 27	12.6
3	1.49	33	1 71	56.0	1.22	8.6	1.11	3 4	1.27	12.6
4	1 49	33	1.71	56.0	1.21	7 8	1.11	3.4	1.27	12.6
5	1.49	33	1 76	62 0	1.20	7.0	1.11	3.4	1 27	12.6
6	1 53	37	1 70	55 0	1.20	7 0	1.08	2 6	1 27	12.6
7	1.50	34	1 66	51 0	1.22	8 6	1 09	2.8	1.32	16.8
8	1 43	27	1 62	46.0	1 22	8.6	1.07	2 4	1 37	21.4
9	1.41	25	1 68	42.0	1 21	7 8	1 08	2 6	1 32	16.8
10	1 41	25	1 57	41 0	1.21	7.8	1.08	2 6	1 27	12.6
11	1.42	26	1 57	41 0	1 22	8 6	1.08	2 6	1 27	12.6
12	1 40	24	1.57	41.0	1 25	11.0	1 07	2.4	1 32	16.8
13	1 40	24	1.56	40 0	1 25	11 0	1.06	2 2	1 37	21.0
14	1 49	33	1.52	36.0	1 32	16 8	1.07	2 4	1.37	21.0
15	1.47	31	1 51	35 0	1.20	7.0	1.06	2 2	1 32	16.8
16	1 43	27	1 51	35 0	1 22	8 6	1 07	2 4	1.32	16.8
17	1 42	26	1 50	34 0	1.32	16.8	1 07	2 4	1 32	16.8
18	1 41	25	1 52	36 0	1 32	16 8	1 07	2 4	1 33	18.0
19	1 42	26	1 50	34 0	1 31	15 9	1 07	2 4	1 34	18.6
20	1 62	46	1 46	30 0	1 32	16 8	1 08	2 6	1.35	19.5
21	1 71	56	1 40	21 0	1 32	16 8	1 12	3 8	1.36	20.0
22	1 71	56	1 37	21 0	1.31	15.9	1.12	3 8	1.37	21.0
23	1 71	56	1 35	19 5	1.31	15 9	1 12	3 8	1.38	22.0
24	1 92	80	1 33	17.7	1 29	14 2	1.17	5 8	1.39	23.0
25	1 97	86	1 32	16 8	1 27	12 6	1 17	5.8	1 40	24.0
26	1 93	82	1 30	15 0	1.22	8 6	1 17	5 8	1 40	24.0
27	2.02	92	1 25	11 0	1.18	5 6	1.17	5 8	1.41	25.0
28	1.97	86	1 24	10 2	1.18	5 6	1.27	12 6	1.42	26.0
29	1.92	80	1 26	11 8	1.20	7.0	1.37	21 0	1.42	26.0
30	1.92	80	1 22	8 6	1.21	7 8	1.32	16 8	1.42	26.0
31			1.21	7.8	1.21	7 8			1.42	26.0

MONTHLY DISCHARGE of Swiftcurrent Creek at Swift Current, for 1913.

(Drainage area, 1,015 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (9-30)	607.0	35 0	193 00	0.190	0 16	8,430
May	78.0	39 0	55 10	0 055	0 06	3,406
June	92.0	24 0	45 20	0.045	0 05	2,690
July	68.0	7 8	34 20	0.034	0 04	2,103
August	16.8	5 6	10.50	0.010	0 01	646
September	21.0	2 2	4 73	0.005	0 01	281
October	26.0	12 6	18 80	0.019	0 02	1,156
The period					0 35	18,712

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Swiftcurrent drainage basin, in 1913

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per Sec.*	*Sec.-ft.*
Aug. 17....	M. H. French...	Bone Creek.....	N.E. 10-11-20-3..	15.3	9.88	0.68	6.70
July 14....	D. B. Gardner....	Jones Creek.....	S. W. 8-8-20-3...	5.5	2.36	0.55	1.30
July 17....	M. H. French...	do	do ...	5.0	2.20	0.36	1.30
July 22....	P. V. Binns.....	do	do ...	4.8	2.06	0.34	0.69
July 30....	M. H. French...	Spring Creek	N.W. 9-9-20-3 ..	*a*	.....	.....	0.26
Feb. 2....	O. H. Hoover...	Swiftcurrent Creek	S.E. 24-15-14-3..	.....	.....	.....	Nil.
Feb. 18....	do ...	do	S.E. 24-15-14-3..	23.0	23.3	0.23	5.30
Mar. 26....	do ...	Jones Creek	S.W. 8-8-20-3...	90.0	51.6	0.30	15.60
April 10....	do ...	do	S.W. 12-15-14-3.	91.0	429.0	1.05	748.00
Feb. 18....	do ...	do	S.W. 19-15-13-3.	.....	.....	.....	Nil.

a Weir measurements.

ANTELOPE LAKE DRAINAGE BASIN.

General Description.

Antelope Lake is a small body of saline water, six miles long and from one to one and a half miles wide, situated at an elevation of 2,300 feet above sea level. It lies in a deep depression north of the main line of the Canadian Pacific Railway, in Tp. 15, Rge. 18, W. 3rd Mer., and drains an area of about 350 square miles.

The lake receives its supply from Bridge Creek, which rises in the Cypress Hills. The altitude of the source of this creek is 2,800 feet and it has an average fall of fifteen feet per mile.

The valley traversed by Bridge Creek is narrow and quite shallow, rarely exceeding 100 feet in depth. The land lying along the creek bottom is very flat and liable to become inundated during periods of flood. The bench land is rolling prairie, cut up by innumerable coulees which drain the surrounding country into the main valley.

The mean annual rainfall amounts to about fourteen inches, most of which occurs during May, June and July. The creek has only a small flow., and is dry along most of its course for several months during the year.

A number of irrigation schemes receive their supply from this basin. The largest of these are Moorhead and Fearon's works, which divert water from Bridge Creek in Sec. 33, Tp. 10, Rge. 22, W. 3rd Mer.

BRIDGE CREEK AT RAYMOND'S RANCHE.

This station was established April 8, 1911, by G. H. Whyte. It is located on the S. E. ¼ Sec. 33, Tp. 10, Rge. 22, W. 3rd Mer., and about 400 yards upstream from the headgate of Fearon and Moorhead's ditch and some two miles from Skull Creek P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is placed at the left side of the channel. The zero of the gauge (elev. 89.42) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank about 50 feet southwest of the gauge.

The channel is straight for about 30 feet above and below the station. The right bank is low and covered with small shrubs, while the left is high and clear of tree growth. The bed of the stream is sandy and shifts. The current is moderate at all stages.

Discharge measurements are made at the gauge by wading, or during high stages at the government bridge three miles below. During most of the season, however, measurements are made with a weir at or near the gauge. The initial point for soundings is a plug driven close to the ground on the left bank, and a tagged wire is strung across the stream to mark the regular section.

During 1912 the gauge was read by Mrs. Charles Raymond.

Discharge Measurements of Bridge Creek at Raymond's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 28	E. W. W. Hughes	4.1	1.32	0.606	0.88	0.800
May 5	do	a			.79	0.490
May 5	do	3.7	1.35	0.526	.66	0.710
June 5	do	a			.45	0.060
July 8	do	a			.38	0.013
Aug. 7	do	a			.46	0.035
Oct. 4	do	2.7	0.90	0.550	.62	0.500
Oct. 28	do	b			0.53	c 0.10

a Weir measurements.
b Ice in stream.
c Discharge estimated.

Daily Gauge-height and Discharge of Bridge Creek, at Raymond's Ranche, for 1913.

Day.	March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			3.17	9.30	0.89	0.77	0.49	0.06
2			3.04	8.80	0.97	1.05	0.51	0.08
3			3.00	8.70	0.89	0.77	0.47	0.05
4			2.94	8.40	0.83	0.59	0.49	0.06
5			2.67	7.40	0.65	0.23	0.45	0.04
6			2.29	6.00	0.66	0.25	0.46	0.05
7			1.86	4.40	0.68	0.28	0.44	0.04
8			1.78	4.10	0.65	0.23	0.43	0.03
9			1.72	3.90	0.66	0.25	0.41	0.02
10			1.34	2.40	0.64	0.22	0.37	0.01
11			1.22	2.00	0.68	0.28	0.39	0.02
12			1.35	2.50	0.64	0.22	0.45	0.04
13			1.32	2.40	0.61	0.18	0.46	0.05
14			1.29	2.30	0.66	0.25	0.41	0.02
15			1.24	2.10	0.59	0.16	0.37	0.01
16			1.23	2.00	0.57	0.14	0.31	0.01
17			1.22	2.00	0.56	0.13	0.46	0.05
18			1.19	1.88	0.59	0.16	0.48	0.06
19			1.12	1.62	0.54	0.11	0.44	0.04
20			1.09	1.50	0.53	0.10	0.55	0.12
21			1.04	1.31	0.55	0.12	0.52	0.09
22			0.99	1.12	0.51	0.08	0.53	0.10
23			0.94	0.95	0.53	0.10	0.55	0.12
24			0.92	0.87	0.51	0.08	0.57	0.14
25			0.89	0.77	0.51	0.08	0.60	0.17
26			0.84	0.61	0.49	0.06	0.61	0.18
27			0.81	0.53	0.47	0.05	0.64	0.22
28			0.88	0.74	0.47	0.05	0.63	0.21
29	3.19	9.40	0.89	0.77	0.45	0.04	0.61	0.18
30	3.29	9.80	0.92	0.87	0.43	0.03	0.63	0.21
31	3.42	10.30			0.46	0.05		

DAILY GAUGE-HEIGHT AND DISCHARGE of Bridge Creek, at Raymond's Ranche, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.60	0.17	0.34	0.01	0.41	0.02	0.64	0.22
2	.61	.22	.33	.01	.35	.01	.66	.25
3	.65	.23	.36	.01	.37	.01	.69	.29
4	.82	.56	.34	.01	.36	.01	.59	.16
5	.84	.61	.36	.01	.38	.01	.61	.18
6	.71	.33	.48	.06	.39	.02	.65	.23
7	.59	.16	.45	.04	.37	.01	.62	.19
8	.38	.01	.46	.05	.42	.03	.61	.18
9	.36	.01	.49	.06	.51	.08	.59	.16
10	.41	.02	.44	.04	.46	.05	.65	.23
11	.59	.16	.41	.02	.44	.04	.64	.22
12	.69	.29	.37	.01	.41	.02	.63	.21
13	.71	.33	.35	.01	.39	.02	.65	.23
14	.76	.43	.48	.06	.37	.01	.61	.18
15	.66	.25	.54	.11	.39	.02	.63	.21
16	.49	.06	.57	.14	.41	.02	.64	.22
17	.41	.02	.61	.18	.42	.03	.61	.18
18	.37	.01	.66	.25	.47	.05	.59	.16
19	.36	.01	.58	.15	.51	.08	.56	.13
20	.36	.01	.54	.11	.57	.14	.57	.14
21	.34	.01	.55	.12	.61	.18	.54	.11
22	.36	.01	.57	.14	.72	.35	.51	.08
23	.33	.01	.51	.08	.89	.77	.49	.06
24	.32	.00	.44	.04	.81	.53	.54	.11
25	.31	.00	.36	.01	.72	.35	.52	.09
26	.33	.01	.37	.01	.77	.45	.48	.06
27	.32	.00	.36	.01	.69	.29	.46	.05
28	.35	.01	.36	.01	.66	.25	.54	.11
29	.39	.02	.38	.01	.68	.28	.53	.10
30	0.36	0.01	.37	.01	0.66	0.25	.56	.13
31			0.41	0.02			0.54	0.11

MONTHLY DISCHARGE of Bridge Creek at Raymond's Ranche, for 1913.

(Drainage area, 6 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
March (29-31)	10.30	9.40	9.830	1.640	0.18	58
April	9.30	0.53	3.070	0.512	0.57	183
May	1.05	0.03	0.229	0.038	0.04	14
June	0.22	0.01	0.083	0.014	0.02	5
July	0.61	0.00	0.132	0.022	0.02	8
August	0.25	0.01	0.058	0.010	0.01	4
September	0.77	0.01	0.146	0.024	0.03	9
October	0.29	0.05	0.161	0.027	0.03	10
The period					0.90	291

BRIDGE CREEK NEAR SKULL CREEK POST OFFICE.

This station was established July 29, 1909, by H. R. Carscallen. It is located at the highway bridge on the surveyed trail running eastward from Maple Creek, on the N. E. ¼ Sec. 11, Tp. 11, Rge. 22, W. 3rd Mer. It is about four miles from Skull Creek P.O., and 27 miles from Maple Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to the centre pile on the downstream side of the bridge. The zero of the gauge (elev. 87.51) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank about 100 feet southeast of the gauge.

The channel is straight for 100 feet above and 30 feet below the station. Both banks are high and not liable to overflow. The stream is entirely devoid of tree growth. The bed of the creek is composed of clay and may shift somewhat at high stages. There is a small amount of vegetation at the station. The current is sluggish.

During high water, discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the inner face of the left or west abutment. Low-water measurements are made near the bridge by wading, and at very low stages a weir is used.

During 1913 the gauge was read by James Mann.

DISCHARGE MEASUREMENTS of Bridge Creek near Skull Creek, Post Office, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sec.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 28	J. S. Wright & E. W. W. Hughes.	7.0	4.55	0.081	1.59	0.37
April 28	do	4.9	5.05	0.132	1.59	0.67
April 28	do	8.5	4.39	0.139	1.59	0.61
May 5	E. W. W. Hughes				1.63	a 0.92
July 8	do				0.59	Nil.
Aug. 14	do					Nil.
Sept. 12	do					Nil.
Oct. 4	do					Nil.
Oct. 28	do					Nil.

a Weir measurement.

Daily Gauge-height and Discharge of Bridge Creek, near Skull Creek Post Office, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.74	11.00	1.71	1.27	a 0.80	Nil	a 0.93	Nil.
2	3.13	8.10	1.73	1.36	0.77	do	0.89	do
3	3.28	8.80	1.71	1.27	a 0.70	do	.91	do
4	3.33	9.00	1.68	1.12	0.63	do	.97	do
5	3.55	10.10	1.65	0.98	.63	do	.93	do
6	3.72	10.90	1.57	.62	.63	do	a .75	do
7	3.43	9.50	1.50	.35	.63	do	.59	do
8	2.85	6.70	1.50	.35	a .63	do	a .59	do
9	2.99	7.40	1.50	.35	.63	do	a .50	do
10	2.97	8.20	1.51	.38	.63	do	.45	do
11	2.80	6.50	a 1.51	.38	.63	do	a .40	do
12	2.79	6.40	1.51	.38	.63	do	.34	do
13	2.76	6.30	1.51	.38	a .63	do	a .34	do
14	2.63	5.70	1.51	.38	a .62	do	.82	do
15	2.57	5.40	1.51	.38	a .62	do	.76	do
16	2.51	5.10	1.49	.33	a .62	do	.59	do
17	2.39	4.60	1.49	.33	a .60	do	b	do
18	2.20	3.60	1.51	.38	a .60	do	.....	do
19	2.13	3.30	1.47	.29	a .60	do	.....	do
20	a 2.00	2.70	1.43	.23	a .60	do	.....	do
21	1.91	2.20	1.40	.19	a .60	do	.....	do
22	1.86	1.99	1.38	.17	a .60	do	.....	do
23	1.78	1.60	1.29	.09	0.91	do	.....	do
24	1.71	1.27	a 1.22	.06	1.00	do	.....	do
25	1.67	1.08	a 1.16	.03	0.94	do	.....	do
26	1.61	0.80	1.06	0.01	0.93	do	.....	do
27	a 1.60	0.75	1.00	Nil.	1.00	do	.....	do
28	1.59	0.70	0.97	do	1.00	do	.....	do
29	1.65	0.98	0.95	do	a 0.98	do	.....	do
30	1.67	1.08	0.91	do	0.95	do	.....	do
31	.....	.....	0.96	do	.....	do	.....	do

a Gauge height interpolated.
b Creek dry at gauge rod for rest of year.

Monthly Discharge of Bridge Creek near Skull Creek Post Office, for 1913.

(Drainage area, 15 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	11.00	0.70	5.060	0.337	0.376	301
May	1.36	0.00	0.389	0.026	0.030	24
June	.....	.....	.....	.....	.....	Nil.
July	.....	.....	.....	.....	.....	Nil.
The period	.....	.....	.....	.....	0.406	325

BRIDGE CREEK AT GULL LAKE.

This station was established March 29, 1911, by G. H. Whyte. It is located at the highway bridge on the S.E. ¼ Sec. 23, Tp. 12, Rge. 19, W. 3rd Mer., near the Canadian Pacific Railway station.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the downstream side of the right abutment of the bridge. The zero of the gauge (elev. 95.63) is referred to a permanent iron bench mark (assumed elev. 100.00) located on the right bank 182 ft. from the gauge and 158 ft. from the northwest corner of the C.P.R. station.

The channel is slightly curved for 160 feet above but is straight for 80 feet below the station. Both banks are low and liable to overflow. The bed of the stream is sandy and liable to shift.

During high stages, discharge measurements are made from the bridge or by wading near the section. During very low stages a weir is used. The initial point for soundings is at the north end of the downstream side of the bridge and is marked with a broad arrow.

From July 5th to the end of the season W. Airth was the observer. There was no flow during this period. No observer was obtainable during the early part of the season; also no discharge measurements were made.

LAKE OF THE NARROWS DRAINAGE BASIN.

General Description.

Lake of the Narrows is a small lake, three miles long and one and a half miles wide, in Township 3, Range 23, West of the 3rd Meridian. It has a drainage area of about 200 square miles.

The principal stream in the basin is Skull Creek, which rises in the eastern slope of Cypress Hills. It flows through a narrow valley for the greater part of its course, but as it nears the lake, the valley widens out into large meadows. The surrounding country is rolling prairie.

The mean annual precipitation in the drainage basin is about 13 inches, but very little rainfall occurred during 1913 causing Skull Creek to go dry in places.

There are several small irrigation ditches in this drainage basin, the largest of which is Moorhead and Fearon's ditch, which diverts water from Skull Creek on the N.E. ¼ Sec. 29, Tp. 10, Rge. 22, W. 3rd Mer.

SKULL CREEK AT DOYLE'S RANCHE.

This station was established April 8, 1911, by G. H. Whyte, to obtain the discharge of the stream above all ditches. It is located on the N.E. ¼ Sec. 29, Tp. 10, Rge. 22, W. 3rd Mer., about one quarter of a mile above the headgates of Fearon and Moorhead's irrigation ditch, one and a half miles above Skull Creek P.O., and half a mile upstream from Thos. Doyle's house.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the left bank. The zero of the gauge (elev. 86.82) is referred to a permanent iron bench mark (assumed elev. 100.00), located 350 feet N. 32° E. of the gauge.

The channel is straight for about 20 feet above and below the station. The right bank is high, while the left is low and liable to overflow during high water stages. Both banks are well wooded. During 1913 an artificial control was constructed about 40 feet below the gauge rod.

Discharge measurements are made at low and ordinary stages by wading or with a weir. At high stages, measurements are made from the traffic bridge at the lower station, which is three miles downstream.

During 1913, the gauge was read by Thomas Doyle.

DISCHARGE MEASUREMENTS of Skull Creek at Doyle's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*S..-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 26	J. S. Wright & E. W. W. Hughes.	12.8	6.1	0.596	1.44	3.60
May 5	E. W. W. Hughes	13.3	6.7	0.681	1.46	4.60
June 5	do	13.0	4.2	0.397	1.35	1.66
June 20	M. H. French	13.6	7.8	1.090	1.65	8.50
July 4	do	13.0	6.0	0.852	1.51	5.10
July 8	E. W. W. Hughes	6.9	2.2	0.500	1.21	1.09
Aug. 7	do	5.4	2.0	0.229	1.16	0.45
Aug. 18	do	15.1	5.7	0.234	1.70	1.34
Sept. 11	do					Nil.
Oct. 3	do	15.5	5.2	0.371	1.77	1.95
Oct. 27	do	15.0	6.0	0.317	1.78	1.91

Daily Gauge-height and Discharge of Skull Creek, at Doyle's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.75*a*	30.0	1.56	6.1	1.32	1.90
2	5.50	30.0	1.53	5.5	1.33	2.00
3	5.60	40.0	1.50	4.8	1.35	2.30
4	5.60	50.0	1.47	4.2	1.35	2.30
5	6.75	50.0	1.46	4.0	1.35	2.30
6	5.53	60.0	1.45	3.8	1.34	2.20
7	5.50	60.0	1.45	3.8	1.35	2.20
8	4.50	80.0	1.45	3.8	1.34*b*	2.20
9	3.50	80.0	1.45	3.8	1.33	2.00
10	3.00*a*	80.0	1.45	3.8	1.32*b*	1.90
11	2.90	87.0	1.45	3.8	1.31*b*	1.80
12	2.62	67.0	1.45	3.8	1.30	1.70
13	2.25	42.0	1.45	3.8	1.32	1.90
14	2.10	31.0	1.46	4.0	1.30	1.70
15	2.00	25.0	1.45	3.8	1.29	1.60
16	1.85	16.4	1.45	3.8	1.30	1.70
17	1.80	14.0	1.44	3.6	1.38	2.70
18	1.70	10.1	1.44	3.6	1.43	3.50
19	1.60	7.1	1.45	3.8	1.33	2.00
20	1.57	6.4	1.44	3.6	1.59	6.90
21	1.57	6.4	1.42	3.3	1.46	4.00
22	1.50	4.8	1.42	3.3	1.40	3.00
23	1.50	4.8	1.40	3.0	1.37	2.50
24	1.50	4.8	1.37	2.5	1.35	2.30
25	1.47	4.2	1.35	2.2	1.40	3.00
26	1.45	3.8	1.35	2.2	1.38	2.70
27	1.45	3.8	1.36	2.4	1.39	2.80
28	1.46	4.0	1.34	2.1	1.36	2.40
29	1.47	4.2	1.35*b*	2.2	1.34	2.10
30	1.50	4.8	1.35	2.2	1.33	2.00
31	.....	.....	1.35	2.2	.....	.....

a Ice conditions, discharges estimated.
b Gauge heights interpolated.

DAILY GAUGE-HEIGHT AND DISCHARGE of Skull Creek, at Doyle's Ranche, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.31	1.80	1.20	0.80	a 1.64	0.94	1.71	1.43
2	1.30	1.70	1.20	0.80	a 1.64	0.94	1.71	1.43
3	1.31	1.80	1.15	0.50	a 1.64	0.94	a 1.77	1.93
4	1.33	2.00	a 1.15	0.50	a 1.64	0.94	1.76	1.84
5	1.32	1.90	1.15	0.50	a 1.64	0.94	a 1.76	1.84
6	a 1.30	1.70	1.25	1.20	a 1.62	0.82	1.76	1.84
7	1.21	0.88	1.25	1.20	a 1.62	0.82	1.77	1.93
8	1.21	0.88	1.26	1.30	a 1.62	0.82	1.78	2.00
9	1.19	0.74	1.30	1.70	a 1.62	0.82	a1.78	2.00
10	1.21	0.88	1.28	1.50	a 1.62	0.82	1.77	1.93
11	1.31	1.80	a 1.27	1.40	a 1.63	0.88	1.77	1.93
12	1.31	1.80	1.26	1.30	a 1.63	0.88	1.77	1.93
13	1.38	2.70	1.23	1.04	a 1.63	0.88	1.77	1.93
14	1.35	2.20	1.23	1.04	a 1.63	0.88	1.75	1.75
15	1.33	2.00	1.32	1.90	a 1.63	0.88	1.77	1.93
16	1.33	2.00	1.33	2.00	a 1.64	0.94	1.77	1.93
17	1.28	1.50	a 1.38	2.70	1.65	1.00	1.76	1.84
18	1.27	1.40	1.41	3.20	1.70	1.35	1.77	1.93
19	1.24	1.12	b 1.70	1.35	1.80	2.20	1.76	1.84
20	1.28	1.50	a 1.68	1.21	1.77	1.93	1.76	1.84
21	a 1.25	1.20	1.67	1.14	1.77	1.93	1.76	1.84
22	1.23	1.04	1.65	1.00	1.85	2.70	1.75	1.75
23	1.25	1.20	1.61	0.76	1.87	3.00	1.77	1.93
24	1.23	1.04	1.61	0.76	1.76	1.84	1.77	1.93
25	1.23	1.04	1.61	0.76	1.75	1.75	1.77	1.93
26	1.23	1.04	a 1.61	0.76	1.75	1.75	1.77	1.93
27	a 1.23	1.04	a 1.62	0.82	1.73	1.59	1.78	2.00
28	1.23	1.04	a 1.63	0.88	1.70	1.35	1.78	2.00
29	1.20	0.80	a 1.64	0.94	1.70	1.35	a 1.78	2.00
30	1.22	0.96	a 1.64	0.94	1.71	1.43	a 1.78	2.00
31	1.20	0.80	1.65	1.00	.....	.....	1.79	2.10

a Gauge height interpolated.
b Artificial control constructed.

MONTHLY DISCHARGE of Skull Creek at Doyle's Ranche, for 1913.

(Drainage area, 30 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	87.0	3.80	30.39	1.010	1.13	1,808
May	6.1	2.10	3.51	0.113	0.13	216
June	6.9	1.60	2.45	0.082	0.09	146
July	2.7	0.74	1.40	0.047	0.05	86
August	3.2	0.50	1.19	0.040	0.05	73
September	3.0	0.82	1.31	0.043	0.05	78
October	2.1	1.43	1.88	0.063	0.07	116
The period	.....	.....	.....	.....	1.57	2,523

SKULL CREEK NEAR SKULL CREEK.

This station was established June 29, 1908, by F. T. Fletcher. It is located on the N.W. ¼ Sec. 10, Tp. 11, Rge. 22, W. 3rd Mer., at the highway bridge on the surveyed trail running east from Maple Creek. It is about two miles north of Skull Creek P.O., and about twenty five miles east of Maple Creek, by trail.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to the centre pile on the upstream or south side of the bridge. The zero of the gauge (elev.

88.41) is referred to a permanent iron bench mark (assumed elev. 100.00), sunk in the left bank of the stream about forty feet southwest of the gauge.

The channel is straight for 100 feet above and 150 feet below the station. Both banks are high and not liable to overflow. The banks are clear of brush for about fifty feet above and below the station, and then become densely wooded. The bed of the stream is composed of sand and may shift somewhat at high stages. The current is moderate.

Discharge measurements are made from the upstream side of the bridge. The initial point for soundings is the inner face of the right abutment of the bridge. There is only one channel at low stages, but owing to the centre row of piles supporting the bridge there are two channels at high stages of the stream. Low water measurements are made at or near the gauge by wading, and at very low stages a weir is used.

During 1913 the gauge was read by J. Mann.

DISCHARGE MEASUREMENTS of Skull Creek near Skull Creek, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft*
April 28	J. S. Wright and E. W. W. Hughes	10.6	7.01	0.744	1.15	5.20
May 5	E. W. W. Hughes	10.5	6.57	0.895	1.47	5.90
June 5	do	6.0	2.11	0.667	0.57	1.41
July 8	do	5.0	1.26	0.579	0.37	0.73
Aug. 14	do	.....	.....	.....	.....	Nil.
Sept. 10	do	.....	.....	.....	.....	Nil.
Sept. 12	do	.....	.....	.....	.....	Nil.
Oct. 4	do	4.7	2.49	0.530	0.62	1.32
Oct. 28	do	7.2	2.71	0.494	0.65	1.34

DAILY GAUGE-HEIGHT AND DISCHARGE of Skull Creek, near Skull Creek, for 1913.

DAY.	April.		May		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.83	54.0	1.09	3.70	0.64*a*	1.39
2	4.61	51.0	1.19	4.40	0.62	1.32
3	3.49	36.0	1.30	5.40	0.60	1.26
4	3.71	39.0	1.22*a*	4.60	0.58	1.20
5	5.42	63.0	1.16	4.20	0.57	1.17
6	6.17	73.0	1.08	3.50	0.57	1.17
7	4.38	47.0	1.05	3.40	0.59	1.23
8	5.03	57.0	1.02	3.10	0.59*a*	1.23
9	4.94	56.0	1.00	3.10	0.59	1.23
10	4.87	55.0	0.98	2.90	0.59	1.23
11	4.82	54.0	0.94*a*	2.70	0.58	1.20
12	4.02	43.0	0.91	2.60	0.61	1.29
13	4.22	46.0	0.87	2.40	0.64	1.39
14	3.22	32.0	0.88	2.40	0.65	1.42
15	3.43	35.0	0.88	2.40	0.63*a*	1.36
16	2.47	21.0	0.87	2.40	0.61	1.29
17	2.05	15.5	0.87	2.40	0.62	1.32
18	1.91	13.5	0.84	2.40	0.66	1.46
19	1.83	12.4	0.81	2.00	0.62	1.32
20	1.63*a*	9.6	0.85	2.20	0.64	1.39
21	1.43	6.9	0.84	2.20	0.66	1.46
22	1.34	5.8	0.82	2.10	0.63*a*	1.36
23	1.26	5.0	0.77	1.87	0.59	1.23
24	1.21	4.6	0.76*a*	1.83	0.56	1.15
25	1.14	4.0	0.74*a*	1.75	0.66	1.46
26	1.12	3.9	0.73	1.71	0.70	1.60
27	1.13*a*	4.0	0.73	1.71	0.67	1.49
28	1.15	4.1	0.72	1.68	0.65	1.42
29	1.10	3.7	0.72	1.68	0.64*a*	1.39
30	1.09	3.7	0.70	1.60	0.63	1.36
31	.....	.....	0.66	1.46	.....	.....

a Gauge height interpolated.

DAILY GAUGE-HEIGHT AND DISCHARGE of Skull Creek, near Skull Creek, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Guage Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	a 0.68	1.53	Dry	Nil.	Dry.	Nil.	0.99	3.00
2	.74	1.75	do	do	do	do	0.98	2.90
3	.76	1.83	do	do	do	do	1.01	3.10
4	.78	1.92	do	do	do	do	0.62	1.32
5	.78	1.92	do	do	do	do	a .58	1.20
6	a .60	1.26	do	do	do	do	.53	1.07
7	.47	0.93	do	do	do	do	.62	1.32
8	.37	0.73	do	do	do	do	.63	1.36
9	.37	0.73	do	do	do	do	.61	1.29
10	.62	1.32	do	do	do	do	a .62	1.32
11	.62	1.32	do	do	do	do	.63	1.36
12	.57	1.18	do	do	do	do	.64	1.39
13	a .66	1.46	do	do	do	do	.70	1.60
14	.75	1.79	do	do	do	do	.70	1.60
15	.63	1.36	do	do	do	do	.71	1.64
16	.49	0.98	do	do	do	do	.71	1.64
17	.47	0.93	do	do	do	do	.72	1.68
18	.55	1.12	0.43	0.85	do	do	.67	1.49
19	.46	0.91	.43	.85	do	do	.59	1.23
20	a .40	.78	.35	.69	do	do	.59	1.23
21	.34	.67	.29	.59	do	do	.60	1.26
22	.29	.59	.21	.47	do	do	.60	1.26
23	.27	.56	0.17	0.42	b 1.04	3.30	.61	1.29
24	.25	.53	Dry.	Nil.	1.00	3.10	.62	1.32
25	.23	.50	do	do	0.99	3.00	.59	1.23
26	.21	.47	do	do	.99	3.00	.58	1.20
27	a .20	.46	do	do	.97	2.90	.59	1.23
28	.18	.44	do	do	.95	2.80	.61	1.29
29	.15	.40	do	do	0.93	2.70	.61	1.29
30	0.11	0.36	do	do	1.00	3.10	.61	1.29
31	Dry.	Nil.	do	do	.....	.....	0.61	1.29

a Gauge height interpolated.
b Heavy rain.

MONTHLY DISCHARGE of Skull Creek near Skull Creek, for 1913.

(Drainage area, 33 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	73.00	3.70	28.600	0.867	0.967	1,702
May	5.40	1.46	2.600	0.080	0.092	162
June	1.60	1.15	1.330	0.040	0.045	79
July	1.92	0.00	0.991	0.030	0.034	61
August	0.85	0.00	0.125	0.004	0.005	8
September	3.30	0.00	0.800	0.024	0.027	48
October	3.00	1.07	1.510	0.046	0.053	93
The period	.....	.....	.....	.....	1.223	2,153

CRANE LAKE DRAINAGE BASIN.

General Description.

Crane Lake is one of the largest of the lakes which receive their supply from the drainage of the northern slope of Cypress Hills. It is situated in Tp. 13, Rge. 23, W. 3rd Mer., and covers an area of 25 square miles.

The lake has no outlet, is shallow, and the water is saline in character. It is fed by Piapot Creek, which rises in the Cypress Hills, flows northeastward, and is joined by Bear Creek in Sec.7, Tp. 12, Rge, 22, W. 3rd Mer., before it reaches the lake.

The country to the north of the lake is rolling and of little use for agriculture, being the eastern end of a range of sand hills which extend northwestward about 40 miles. South of the lake the country is rolling prairie, which is bare of tree growth, except along the creeks where there is small growth of willow and shrub. As one gets closer to the hills the country becomes more broken and the tree growth increases, making the ravines and coulees at the head of the creeks natural reservoirs, which regulate the spring run-off considerably.

There are a number of irrigation schemes in operation and a number proposed, in this basin, also one or two industrial schemes along the main line of the Canadian Pacific Railway.

The mean annual precipitation of the northern part of the basin is about 12 inches, but in the hills this is exceeded. During the winter season, from November to April, the streams are frozen over.

EAST BRANCH OF BEAR CREEK AT JOHNSON'S RANCHE.

This station was established August 18, 1909, by H. R. Carscallen. It is located on the S.E. ¼ Sec. 21, Tp. 10, Rge. 23, W. 3rd Mer., about a mile and a half southeast of Skibereen P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to a vertical post sunk in the bed of the stream at the right bank and securely stayed. The zero (elev. 92.26) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank in the line of the gauging section and 53 feet from the gauge.

The channel is straight for 50 feet above and 40 feet below the station. Both banks are high, and not liable to overflow except during extreme floods. The banks are free from brush at the station, but are wooded above and below. The bed of the stream is composed of coarse grave and stones. Large stones in the bed of the stream make accurate soundings at the station rather difficult to obtain. The current is moderate.

Discharge measurements are made at or near the gauge by wading, or by means of a weir A measuring wire is stretched across the stream at the section. The initial point for soundings is a square stake, d iven close to the ground on the left bank and marked "I.P."

During 1913 the gauge was read by Mrs. F. Quarry.

DISCHARGE MEASUREMENTS of East Branch Bear Creek at Johnson's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Gauge	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 3	E. W. W. Hughes	9.7	8.0	1.020	1.29	8.20
June 2	do	11.2	5.7	0.381	1.05	2.20
July 7	do	10.4	5.8	.277	1.00	1.61
Aug. 7	do	6.0	1.8	.118	0.80	0.21
Aug. 15	do	5.9	2.6	.523	0.99	1.37
Sept. 9	do	.....	.....	.....	.....	Nil.
Oct. 9	do	11.0	3.3	.642	1.10	2.10
Sept. 10	do	.....	.....	.....	.....	Nil.
Oct. 29	do	11.5	5.0	0.522	1.08	2.60

Daily Gauge-height and Discharge of East Branch Bear Creek, at Johnson's Ranche, for 1913.

Dp .	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	1.05	2.20	1.02	1.79	*b*0.60	0.01	0.65	0.02	1.00	1.55
2	..... *a*	.....	1.05	2.20	1.00	1.55	*b*0.60	0.01	0.70	0.03	0.98	1.37
3	1.29	8.2	1.04	2.00	0.95	1.10	*b*0.60	0.01	0.75	0.10	0.98	1.37
4	1.25	6.8	1.05	2.20	1.12	3.40	*b*0.60	0.01	0.60	0.01	1.00	1.55
5	1.35	10.8	1.04	2.00	1.05	2.20	*b*0.60	0.01	0.55	Nil	1.05	2.20
6	1.32	9.5	1.04	2.00	1.00	1.55	*b*0.60	0.01	0.52	"	1.08	2.60
7	1.30	8.6	1.02	1.79	0.98	1.37	0.80	0.22	0.48	"	1.10	3.00
8	1.33	9.9	1.00	1.55	0.96	1.19	0.81	0.26	0.48	"	1.10	3.00
9	1.30	8.6	0.98	1.37	0.92	0.87	0.78	0.17	0.65	0.02	1.08	2.60
10	1.24	6.5	0.94	1.02	0.92	0.87	0.75	0.10	0.70	0.03	1.08	2.60
11	1.33	9.9	0.90	0.72	1.05	2.20	0.73	0.07	0.68	0 03	1.05	2.20
12	1.30	8.6	0.95	1.10	1.02	1.79	0.70	0.03	0.70	0.03	1.05	2.20
13	1.33	9.9	0.93	0.95	1.08	2.60	0.66	0.02	0.63	0.02	1.08	2.60
14	1.24	6.5	0.92	0.87	1.12	3.40	0.93	0.95	0.70	0.03	1.08	2.60
15	1.20	5.2	0.90	0.72	1.05	2.20	0.90	0.72	0.68	0.02	1.07	2.50
16	1.23	6.2	0.85	0 44	0.95	1.10	0.86	0.50	0.90	0.72	1.07	2.50
17	1.30	8.6	0 95	1.10	0.85	0.44	0.84	0.40	0.90	0.72	1.06	2.30
18	1.17	4.5	1.00	1.55	0.80	0.22	1.06	2.30	0.92	0 87	1.06	2.30
19	1.20	5.2	0.96	1.19	0.78	0.17	1.03	1.91	0.90	0.72	1.06	2.30
20	1.18	4.7	1.18	4.70	*b*0.60	0.01	1.01	1.67	0.94	1.02	1.05	2.20
21	1.16	4.2	1.10	3.00	*b*0.60	0.01	0.95	1.10	0.96	1.19	1.06	2.30
22	1.15	4.0	1.05	2.20	*b*0.60	0.01	0.91	0.80	1.10	3.00	1.06	2.30
23	1.14	3.8	1.04	2.00	*b*0.60	0.01	0.85	0.44	1.10	3.00	1.06	2.30
24	1.15	4.0	1.15	4.00	*b*0.60	0.01	0.80	0.22	1.08	2.60	1.07	2.50
25	1.14	3.8	1.12	3.40	*b*0.60	0.01	0.74	0.09	1.04	2.00	1.07	2.50
26	1.16	4.2	1.12	3.40	*b*0.60	0.01	0.70	0.03	1.02	1.79	1.06	2.30
27	1.16	4.2	1.10	3.00	*b*0.60	0.01	0.68	0.03	0.98	1.37	1.06	2.30
28	1.12	3.4	1.05	2.20	*b*0.60	0.01	0.63	0.02	0.96	1.19	1.05	2.20
29	1.10	3.0	1.02	1.79	*b*0.60	0.01	0.65	0.02	0.98	1.37	1.06	2.30
30	1.08	2.6	1.00	1.55	*b*0.60	0.01	0.60	0.01	1.00	1.55	1.07	2.50
31	1.06	2.3	.....	.....	*b*0.60	0.01	0.68	0.03	.....	.....	1.08	2.60

a No observations made prior to May 3.
b Gauge height interpolated.

Monthly Discharge of East Branch Bear Creek at Johnson's Ranche, for 1913.

(Drainage area, 22 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage. Acre.	Total in Acre-feet.
May 3-31	10.8	2.30	6.130	0.279	0.30	353
June	4.7	0.44	1.940	0.088	0.10	115
July	3.4	0.01	0.972	0.044	0.05	60
August	2.3	0.01	0.392	0.018	0.02	24
September	3.0	0.00	0.523	0.024	0.03	31
October	3.0	1.37	2.310	0.105	0.12	142
The period					0.62	725

WEST BRANCH OF BEAR CREEK AT BERTRAM'S RANCHE.

This station was established September 16, 1909, by H. R. Carscallen. It is located on the S.W. ¼ Sec. 32, Tp. 10, Rge. 23, W. 3rd Mer. It is about three hundred yards above the junction of this branch with the east branch of Bear Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a post sunk n the bed of the stream at the left bank and firmly stayed to the bank. The zero of the gauge (elev 92.25) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank about 35 feet from the gauge.

The channel is straight for 25 feet above and 15 feet below the station. Both banks are comparatively high and will overflow only in extreme flood. The banks are free from brush at the station, but are heavily wooded immediately above and twenty feet below. The bed of the creek is composed of sand and coarse gravel. The current is moderate at the station, and becomes very swift twenty feet downstream.

During ordinary stages discharge measurements are made at, or a short distance below, the gauge by wading. High-water measurements are made at the government bridge, situated about three-quarters of a mile upstream. The initial point for soundings at the station is a square stake driven close to the ground on the left bank and marked "I.P."

During 1913, the gauge was read by Charles Bertram.

DISCHARGE MEASUREMENTS of West Branch of Bear Creek at Bertram's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 3	E. W. W. Hughes	15.6	10.3	2.330	1.54	24.00
June 2	do	9.5	4.8	0.933	1.21	4.50
June 18	do	21.5	5.7	0.482	1.21	2.70
July 7	do	8.7	4.1	0.663	1.21	2.70
Aug. 14	do	4.0	1.0	0.287	1.01	0.29
Sept. 9	do	.....	.....	.....	0.45	Nil.
Oct. 9	do	10.0	3.9	1.070	1.25	4.20
Oct. 31	do	11.5	3.9	0.849	1.22	3.30

DAILY GAUGE-HEIGHT AND DISCHARGE of West Branch of Bear Creek, at Bartram's Ranche, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.56	118.0	1.54	24.0	1.26	4.40
2	2.66	127.0	1.56	26.0	1.21	2.90
3	2.76	136.0	1.56	26.0	1.16	1.80
4	2.96	155.0	1.54	24.0	1.16	1.80
5	3.06	164.0	1.52	22.0	1.11	1.04
6	4.06	256.0	1.51	21.0	1.11	1.04
7	3.06	164.0	1.46	17.2	1.10	0.90
8	2.66	127.0	1.46	17.2	1.07	0.63
9	2.36	100.0	1.46	17.2	1.07	0.63
10	2.36	100.0	1.46	17.2	1.07	0.63
11	2.56	118.0	1.46	17.2	0.98	0.21
12	2.66	127.0	1.44	15.6	0.98	0.21
13	3.06	164.0	1.44	15.6	1.08	0.72
14	2.06	72.0	1.44	15.6	0.98	0.21
15	1.96	63.0	1.44	15.6	0.98	0.21
16	1.66	35.0	1.44	15.6	0.90	0.10
17	1.56	26.0	1.36	9.7	1.00	0.25
18	1.56	26.0	1.36	9.7	1.10	0.90
19	1.58	28.0	1.36	9.7	1.20	2.60
20	1.54	24.0	1.36	9.7	1.40	12.40
21	1.54	24.0	1.36	9.7	1.40	12.40
22	1.52	22.0	1.36	9.7	1.35	9.00
23	1.52	22.0	1.36	9.7	1.35	9.00
24	1.50	21.0	1.36	9.7	1.35	9.00
25	1.50	21.0	1.36	9.7	1.45	16.40
26	1.50	21.0	1.32	7.3	1.40	12.40
27	1.50	21.0	1.32	7.3	1.40	12.40
28	1.50	21.0	1.32	7.3	1.35	9.00
29	1.46	17.2	1.32	7.3	1.35	9.00
30	1.46	17.2	1.32	7.3	1.30	6.20
31	.....	.....	1.32	7.3	.....	.....

Daily Gauge-height and Discharge of West Branch of Bear Creek, at Bertram's Ranche, for 1913.—*Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.20	2.60	0.50	Nil.	0.55	Nil.	1.15	1.60
2	1.30	6.20	.50	do	0.55	do	1.15	1.60
3	1.35	9.00	.50	do	0.55	do	1.15	1.60
4	1.40	12.40	.50	do	0.55	do	1.15	1.60
5	1.50	21.00	.50	do	0.50	do	1.20	2.60
6	1.35	9.00	.50	do	0.50	do	1.35	9.00
7	1.20	2.60	.50	do	0.50	do	1.30	6.20
8	1.10	0.90	0.50	do	0.50	do	1.24	3.70
9	1.00	0.25	1.00	0.25	0.45	do	1.20	2.60
10	.90	0.10	1.00	.25	0.50	do	1.20	2.60
11	1.30	6.20	1.10	.90	0.50	do	1.20	2.60
12	1.10	0.90	1.10	.90	0.50	do	1.20	2.60
13	1.00	0.25	0.90	.10	0.50	do	1.20	2.60
14	1.40	12.40	.90	.10	0.50	do	1.35	9.00
15	1.30	6.20	.90	.10	0.50	do	1.35	9.00
16	1.00	0.25	.90	.10	0.50	do	a 1.35	9.00
17	1.00	0.25	.90	.10	0.50	do	1.35	9.00
18	0.60	Nil.	.90	.10	0.50	do	1.35	9.00
19	1.00	0.25	.70	.01	0.50	do	1.20	2.60
20	0.60	Nil.	.70	.01	0.50	do	1.35	9.00
21	.60	do	.70	.01	0.50	do	1.35	9.00
22	.60	do	.70	.01	1.10	0.90	1.35	9.00
23	.60	do	.60	Nil.	1.40	12.40	1.28	5.30
24	.60	do	.60	do	1.30	6.20	1.28	5.30
25	.60	do	.60	do	1.30	6.20	1.28	5.30
26	.60	do	.60	do	1.20	2.60	1.28	5.30
27	.60	do	.60	do	1.20	2.60	1.30	6.20
28	.60	do	.60	do	1.20	2.60	1.30	6.20
29	.60	do	.60	do	1.20	2.60	1.30	6.20
30	.55	do	.55	do	1.15	1.60	1.30	6.20
31	0.55	do	0.55	do	.....	.....	1.30	6.20

a Gauge height interpolated.

Monthly Discharge of West Branch of Bear Creek at Bertram's Ranche, for 1913.

(Drainage area, 45 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet
April	256.00	17.20	77.90	1.730	1.930	4,635
May	26.00	7.30	14.10	0.313	0.360	867
June	16.40	0.10	4.60	1.020	1.140	274
July	21.00	0.00	2.90	0.065	0.080	180
August	0.90	0.00	0.10	0.002	0.002	58
September	12.40	0.00	1.26	0.028	0.030	75
October	9.00	1.60	5.49	0.122	0.140	338
The period	.....	.....	.....	.....	3.682	6,427

BEAR CREEK NEAR UNSWORTH'S RANCHE

This station was established June 22, 1908, by F. T. Fletcher. It is located on the S.E. ¼ Sec. 18, Tp. 11, Rge. 23, W. 3rd Mer., at the highway bridge on the surveyed trail running east from Maple Creek. It is about one half mile south of S. Unsworth's ranche, and fifteen miles east of Maple Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to the centre pile of the downstream side of the bridge. It is referred to a circle of nail-heads

in the top of the stringer at the left abutment on the downstream side of the bridge; elevation, 14.05 feet above the zero of the gauge.

The channel is straight for 100 feet above and below the station. Both banks are high and not liable to overflow. The station is kept clear of underbrush, but both banks are covered with small trees above and below the bridge. The bed of the stream is sandy and is liable to change at high stages of the creek. The current is moderate, becoming sluggish at very low stages.

Discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the inner face of the left abutment of the bridge. Low water measurements are made at a wading section about one half mile downstream from the gauge, or about 200 feet above. There is only one channel at low stages, but at high stages the centre row of piles supporting the bridge divides the stream into two channels. Gauge height records are sometimes affected by beaver dams.

During 1913, the gauge was read by S. Unsworth.

Discharge Measurements of Bear Creek near Unsworth's Ranche, in 1913.

Date.	Hydrographer	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 3	E. W. W. Hughes	11.5	27.8	0.777	2.53	21.60
June 3	do	9.3	13.1	0.460	1.12	6.00
July 7	do	9.0	9.7	0.357	1.00	3.50
Aug. 14	do	5.3	3.8	0.291	1.23	1.10
Sept. 9	do	.....	.....	.....	0.90	Nil.
Oct. 8	do	10.7	6.8	0.474	1.65	3.20
Oct. 31	do	9.5	3.7	1.320	1.76	4.80

Daily Gauge-height and Discharge of Bear Creek, near Unsworth's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	8.91	234.0	2.48	21.0	1.33	6.6
2	8.41	217.0	2.53	22.0	1.18	5.7
3	7.83	197.0	2.48	21.0	1.12	5.3
4	7.13	173.0	2.43	19.7	1.08	5.1
5	6.83	163.0	2.33	17.9	1.03	4.8
6	10.58	291.0	2.23	16.3	0.98	4.5
7	11.25	314.0	2.18	15.5	0.98	4.5
8	9.58	257.0	2.18	15.5	0.98	4.5
9	8.65	225.0	2.18	15.5	0.93	4.2
10	8.58	223.0	2.18	15.5	0.83	3.6
11	9.38	250.0	2.16	15.2	0.73	3.0
12	10.28	280.0	2.16	15.2	0.68	2.7
13	8.73	228.0	2.18	15.5	0.77	3.2
14	6.33	146.0	2.18	15.5	0.83	3.6
15	5.08	104.0	2.18	15.5	0.78	3.3
16	4.18	73.0	2.18	15.5	0.78	3.3
17	3.83	61.0	2.13	14.8	0.78	3.3
18	3.53	51.0	2.03	13.6	0.93	4.2
19	3.18	39.0	1.93	12.4	0.98	4.5
20	3.03	34.0	1.88	11.8	1.43	5.4
21	2.98	33.0	1.83	11.2	1.43	7.4
22	2.83	28.0	1.78	10.6	1.48	7.8
23	2.53	22.0	1.73	10.1	1.43	7.4
24	2.38	18.8	1.73	10.1	1.43	7.4
25	2.23	16.3	1.63	9.1	1.53	8.2
26	2.18	15.5	1.58	8.6	1.63	9.1
27	2.23	16.3	1.53	8.2	1.58	8.6
28	2.33	17.9	1.51	8.1	1.43	7.4
29	2.38	18.8	1.48	7.8	1.38	7.0
30	2.43	19.7	1.48	7.8	1.33	6.6
31	.....	.....	1.43	7.4	.....	.....

DAILY GAUGE-HEIGHT AND DISCHARGE of Bear Creek, near Unsworth's Ranche, for 1913. —*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.28	6.30	1.03	1.63	0.85	0.10	1.40	1.85
2	1.23	6.00	1.03	1.54	0.85	.10	1.45	2.10
3	1.18	5.70	1.03	1.45	0.85	.10	1.55	2.80
4	1.18	5.70	1.03	1.36	0.88	.16	1.60	3.10
5	1.63	9.10	1.03	1.27	0.90	.20	1.65	3.50
6	1.23	6.00	1.03	1.16	0.90	.20	1.65	3.50
7	1.03	4.80	1.03	1.08	0.90	.20	1.70	3.90
8	0.93	4.10	1.03	1.00	0.90	.20	1.70	3.90
9	0.78	3.30	1.03	0.92	0.90	.20	1.70	3.90
10	0.73	2.60	1.03	0.82	0.90	.20	1.68	3.70
11	2.03	12.40	1.03	0.75	0.93	.26	1.68	3.70
12	1.73	9.20	1.03	0.66	0.93	.26	1.68	3.70
13	1.63	8.00	1.13	0.85	0.93	.26	1.65	3.50
14	1.63	7.80	1.23	1.12	0.93	.26	1.65	3.50
15	1.53	6.80	1.30	1.40	0.93	.26	1.65	3.50
16	1.33	5.40	1.30	1.40	0.93	.26	1.63	3.30
17	1.03	3.50	1.30	1.40	0.93	.26	1.60	3.10
18	0.93	2.80	1.35	1.60	0.93	.26	1.60	3.10
19	0.83	2.20	1.35	1.60	0.93	.26	1.60	3.10
20	0.78	1.73	1.30	1.40	0.93	.26	1.63	3.30
21	0.73	1.35	1.25	1.20	0.95	.30	1.15	3.50
22	0.68	0.97	1.22	1.08	1.15	0.85	1.68	3.70
23	0.63	0.63	1.20	1.00	1.20	1.00	1.70	3.90
24	0.63	.58	1.15	0.85	1.23	1.12	1.70	3.90
25	0.63	.55	1.10	0.70	1.25	1.20	1.75	4.40
26	0.63	.65	1.05	0.55	1.25	1.20	1.75	4.40
27	0.63	.59	1.00	0.40	1.25	1.20	1.75	4.40
28	0.63	.54	0.90	0.20	1.30	1.40	1.70	3.90
29	0.78	0.93	0.85	0.10	1.30	1.40	1.65	3.50
30	0.88	1.20	0.85	0.10	1.35	1.60	1.75	4.40
31	1.03	1.75	0.85	0.10	.....	.....	1.75	4.40

a Shifting conditions from July 8th to August 13th.

MONTHLY DISCHARGE of Bear Creek near Unsworth's Ranche, for 1913.

(Drainage area, 100 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	314.00	15.50	126.00	1.260	1.400	2,468
May	22.00	7.40	13.70	0.137	0.158	842
June	9.10	2.70	5.40	0.054	0.062	322
July	12.40	0.54	4.00	0.040	0.046	244
August	1.63	0.10	0.99	0.010	0.011	61
September	1.60	0.10	0.52	0.005	0.006	30
October	4.40	1.85	3.40	0.034	0.039	210
The period	.....	.....	.....	.....	1.722	4,177

PIAPOT CREEK AT CUMBERLAND'S RANCHE.

This station was established June 17, 1908, by F. T. Fletcher. It was originally located on Sec. 17, Tp. 11, Rge. 24, W. 3rd Mer., at the highway bridge on the surveyed trail running east of Maple Creek and about nine miles from Maple Creek. On account of the difficulty of obtaining an observer, it was moved on May 13, 1909, by H. R. Carscallen to a wading section near A. Cumberland's house. It is now located in the N.E. ¼ Sec. 18, Tp. 11, Rge. 24 W. 3rd Mer., about one mile north of the bridge.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a post sunk in the bed of the stream at the left bank and securely stayed to the bank. The zero (elev. 88.75) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank 47 feet N. 40° E. from the gauge, and sunk within five inches of the ground.

The channel is straight for 50 feet above and 100 feet below the station. The right bank is high and not liable to overflow; the left is comparatively low and will overflow at flood stages of the stream. The bed of the stream is composed of sand and may shift during high stages. The current is sluggish. During the summer months vegetation in the stream bed gives considerable trouble.

During ordinary stages, discharge measurements are made from the downstream side of the bridge at the old station.

During 1913 the gauge was read by A. Cumberland.

DISCHARGE MEASUREMENTS of Piapot Creek at Cumberland's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 2	E. W. W. Hughes	11.0	10.30	1.140	1.79	11.80
June 2	do	10.5	2.90	0.438	1.05	1.27
July 7	do	.....	.....	.....	1.07	a 0.34
Aug. 8	do	9.3	1.11	0.515	1.05	0.57
Sept. 9	do	9.1	0.34	0.490	0.99	0.17
Oct. 8	do	10.0	2.74	0.362	1.12	0.99
Oct. 31	do	10.6	5.73	0.614	1.37	3.50

a Weir measurement.

DAILY GAUGE-HEIGHT AND DISCHARGE of Piapot Creek, at Cumberland's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	6.70	139.0	1.71	9.8	1.13	2.10
2	6.52	135.0	1.79	11.8	1.03	1.10
3	6.40	132.0	1.82	12.8	1.00	0.86
4	6.37	131.0	1.81	12.8	1.17	2.30
5	6.04	122.0	1.77	12.1	1.12	1.79
6	6.24	127.0	1.70	10.6	1.07	1.30
7	6.00	121.0	1.55	7.4	1.14	1.90
8	5.75	115.0	1.40	4.8	1.09	1.41
9	5.33	104.0	1.35	4.1	1.08	1.29
10	5.25	102.0	1.37	4.5	1.07	1.19
11	4.55	84.0	1.32*a*	3.9	1.07	1.15
12	2.91	41.0	1.28	3.6	1.03	0.80
13	2.51	30.0	2.04	21.0	1.06	1.00
14	2.78	37.0	1.37	5.2	1.04	0.82
15	2.15	21.0	1.46	7.0	1.02	0.66
16	2.05	18.5	1.35	5.0	1.00	0.51
17	2.00	17.2	1.40	6.0	1.07	0.95
18	1.90	14.6	1.40	6.3	1.08	1.00
19	1.75	10.8	1.37	5.8	1.04	0.69
20	1.74	10.5	1.30	4.8	1.24	2.40
21	1.72	10.1	1.26	4.2	1.13*a*	1.30
22	1.67	8.9	1.32	5.1	1.05	0.67
23	1.63	8.1	1.30	4.8	0.99	0.28
24	1.57	6.8	1.30	4.8	1.01	0.37
25	1.55	6.4	1.30	4.8	1.26	2.40
26	1.51	5.6	1.18	3.1	1.74	10.60
27	1.47	4.9	1.16	2.9	1.48	4.90
28	1.57	6.8	1.18	3.0	1.38	3.60
29	1.65	8.5	1.17	2.9	1.26	2.20
30	1.73	10.3	1.16	2.7	1.27	2.30
31	.....	.....	1.04	1.4	.....	.....

a Gauge height interpolated.

DAILY GAUGE-HEIGHT AND DISCHARGE of Piapot Creek, at Cumberlands Ranche, for 1913. —*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.22	1.71	1.05	0.49	1.01	0.28	a 1.05	0.50
2	1.28	2.30	1.04	.43	1.00	.22	1.04	.44
3	1.31	2.50	1.01	.28	0.99	.18	1.04	.44
4	a 1.33	2.80	a 1.02	.35	0.97	.09	1.05	.50
5	1.35	2.90	1.04	.47	0.96	0.04	1.05	.50
6	1.22	1.49	1.06	.60	0.95	Nil.	1.12	0.99
7	1.25	1.73	1.05	.55	0.96	0.04	1.14	1.14
8	0.94	0.30	1.04	.44	0.96	0.04	1.13	1.07
9	1.02	.04	1.02	.33	0.99	0.18	1.10	0.84
10	0.92	.04	1.08	.70	0.94	Nil.	1.09	.77
11	0.93	.04	1.05	.50	0.99	0.18	1.08	.70
12	0.90	.04	1.02	.32	0.99	0.18	1.07	.64
13	0.94	.04	1.00	.22	0.95	Nil.	1.07	.64
14	1.00	.06	1.09	0.77	0.89	do	1.05	.50
15	0.92	.03	1.15	1.22	0.95	do	1.08	.70
16	0.90	.02	1.07	0.64	1.00	0.22	1.07	.64
17	1.01	.13	1.05	.50	1.00	.22	1.07	.64
18	1.04	.29	1.08	.70	1.00	.22	1.07	.64
19	1.09	.59	1.09	.77	1.11	.91	1.11	.91
20	1.10	.67	1.03	.39	1.07	.64	1.08	.70
21	1.07	.49	1.02	.32	a 1.10	.84	1.07	.64
22	1.06	.46	1.03	.39	1.12	0.99	1.07	.64
23	1.07	.52	1.01	.28	1.32	2.90	1.07	.64
24	1.03	.30	1.00	.22	1.13	1.07	1.07	.64
25	1.00	.16	0.98	.13	1.10	0.84	1.06	.57
26	1.02	.26	0.99	.18	1.09	.77	1.07	.64
27	1.03	.32	0.97	.09	1.07	.64	1.10	.84
28	1.02	.28	0.99	.18	1.06	.57	1.10	.84
29	1.01	.23	0.99	.18	1.03	.39	1.10	.84
30	1.02	.30	1.00	.22	1.05	0.50	1.09	.77
31	1.04	0.41	1.04	0.44	.....	.....	1.13	1.07

a Gauge height interpolated.

MONTHLY DISCHARGE of Piapot Creek at Cumberland's Ranche, for 1913.

(Drainage area, 50 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	139.00	4.90	53.000	1.060	1.180	3,152
May	21.00	1.40	6.420	0.128	0.148	395
June	10.60	0.28	1.790	0.036	0.040	106
July	2.90	0.02	0.692	0.014	0.016	42
August	1.22	0.09	0.429	0.008	0.009	26
September	2.90	0.00	0.438	0.009	0.010	26
October	1.14	0.44	0.711	0.014	0.016	44
The period	.....	.....	.....	.....	1.419	3,791

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Crane Lake drainage basin, in 1913

Date.	Hydrographer.	Stream.	Location.	Width.	Area of of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per Sec.*	*Sec.-ft.*
June 19....	P. V. Binns.....	East Branch of of Bear Creek...	N.E. 29-10-23-3..	8.0	3.15	0.46	1.45
June 18....	do ...	West Branch of Bear Creek.....	N.W. 29-10-23-3.	11.4	5.95	0.41	2.46

HAY LAKE DRAINAGE BASIN.

General Description.

Hay Lake is in Township 11, Range 25 West of the Third Meridian, and is fed by Hay Creek which rises in the Cypress Hills. It is a comparatively small body of saline water of an approximate area of three square miles. Like all lakes in this locality it has no outlet.

The basin supplies water for a number of irrigation schemes, and also to the town of Maple Creek for domestic and industrial purposes, the water being piped some nine miles, by means of a gravity system.

The annual precipitation averages about twelve inches; during 1913 it was slightly less than this amount.

HAY CREEK AT HAY CREEK SCHOOL.

This station was established on July 4, 1910, by R. G. Swan. It is located on the S.W. ¼ Sec. 29, Tp. 10, Rge. 25, W. 3rd Mer., and is above Mr. Fauquier's ditch and below the overflow of the Maple Creek waterworks reservoir.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the right bank of the stream. The zero of the gauge (elev. 94.79) is referred to a permanent iron bench mark (assumed elev. 100.00) sunk in the right bank about 125 feet east of the gauge.

The channel of the creek is slightly curved for about eight feet above and 50 feet below the gauge. The bed of the stream is sandy and covered with vegetation, which affects the point of control. The current is sluggish, and during high stages both banks, being low, are liable to overflow.

Discharge measurements are made with a meter at high stages and with a weir at ordinary and low stages.

During 1913 the gauge was read by Miss F. Burnham until June 30th; it was read for the remainder of the season by Miss K. Jones.

DISCHARGE MEASUREMENTS of Hay Creek at Hay Creek School, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 12.....	J. S. Wright	8.5	9.34	1.32	1.96	12.40
May 27.....	E. W. W. Hughes.....	.....	.....	.....	1.27	a 0.15
July 3.....	do	.....	.....	.....	1.35	a 0.30
July 23.....	do	.....	.....	.....	1.20	a 0.65
Oct. 3.....	do	.....	.....	.....	0.79	Nil. b
Oct. 23.....	do	.....	.....	.....	0.61	Nil. b

a Weir measurement.
b Water standing in pools.

Daily Gauge-height and Discharge of Hay Creek, at Hay Creek School, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2 98	43 0	1 47	1 04	1 25*a*	0.10
2	2 34	24.0	1 51	1 42	1 25	0.10
3	2 08	16.0	1 43*a*	0 70	1 25*a*	0.10
4	2 08	16.0	1 35	0 30	1 26	0.11
5	2 21	20.0	1 35	0 30	1 26	0.11
6	2 14	17 9	1 35	0 30	1.25	0.10
7	2.14	17 9	1 36	0 33	1 23*a*	0 08
8	2 00	13 6	1 38	0 39	1 22*a*	0.07
9	1.70	4 6	1 39	0 42	1.20	0.05
10	1.66	3.8	1 38*a*	0 39	1 20	0.05
11	1 86	9 4	1 36*a*	0 33	1 20	0.05
12	1 86	9 4	1 35	0 30	1 21	0.06
13	1 86	9 4	1 35*a*	0 30	1 21	0 06
14	1 79	7 3	1 36	0 33	1 22*a*	0 07
15	1 70	4 6	1 37	0 36	1 23*a*	0 08
16	1.64	3 4	1 37	0 36	1 24	0 09
17	1 60	2 6	1 35*a*	0 30	1 27	0.12
18	1.45	0 88	1 33*a*	0 24	1 27	0.12
19	1 46	0 96	1 32	0 21	1 28	0 13
20	1 44	0 79	1 30	0 15	1 28*a*	0.13
21	1 44	0.79	1 28	0 13	1 28*a*	0.13
22	1.42	0.62	1 27	0 12	1 28*a*	0.13
23	1 38	0.39	1 26	0.11	1 28	0.13
24	1 35	0.30	1 26*a*	0 11	1 30	0.15
25	1 29	0.14	1.25*a*	0 10	1 31	0.18
26	1 36	0 33	1 25	0 10	1.40	0.45
27	1.26	0.11	1.25	0 10	1 32	0.21
28	1.25	0 10	1 25	0 10	1.22*a*	0.07
29	1.30	0.15	1 25	0.10	1.14*a*	0.03
30	1.47	1.04	1 26	0.11	1.07	0.01
31			1.26*a*	0.11		

a Gauge height interpolated.

Daily Gauge-height and Discharge of Hay Creek, at Hay Creek School, for 1913.—*Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.16	0.04	1.01	0.00	0.86	Nil.	0.77	Nil.
2	1.17	.04	1.02	.00	.85	do	.79	do
3	1.18	.04	1.03	.01	.85	do	.79	do
4	1.17	.04	1.04	.01	.83	do	.79	do
5	1.17	.04	1.05	.01	.79	do	.80	do
6	1.16	.04	1.05	.01	.79	do	.76	do
7	1.16	.04	1.04	.01	.79	do	.76	do
8	1.16	.04	1.04	.01	.78	do	.76	do
9	1.16	.04	1.05	.01	.79	do	.77	do
10	1.16	.04	1.06	.01	.80	do	.78	do
16	1.16	.04	1.09	.02	.81	do	.74	do
17	1.17	.04	1.06	.01	.80	do	.74	do
13	1.18	.04	1.04	.01	.83	do	.74	do
19	1.17	.04	1.04	.01	.84	do	.74	do
15	1.15	.04	1.03	.01	.84	do	.73	do
16	1.15	.04	1.03	.01	.83	do	.68	do
17	1.18	.04	1.03	.01	.84	do	.68	do
18	1.18	.04	1.04	.01	.83	do	.67	do
19	1.17	.04	1.01	.00	.83	do	.67	do
20	1.15	.04	1.04	.01	.82	do	.66	do
21	1.15	.04	1.04	.01	.82	do	.60	do
22	1.16	.04	1.03	.01	.82	do	.60	do
23	1.17	.04	1.02	.00	.76	do	.61	do
24	1.17	.04	1.01	.00	.76	do	.60	do
25	1 17	.04	1.01	.00	.77	do	.61	do
26	1.18	.04	1.00	.00	.78	do	.61	do
27	1.19	.05	0.99	a Nil.	.79	do	.61	do
28	1.20	.05	.93	do	.80	do	.61	do
29	1.22	.07	.93	do	.81	do	.61	do
30	1.20	.05	.94	do	0.81	do	.62	do
31	1.21	0.06	0.91	do			0.62	do

a Water in pools to October 31st.

Monthly Discharge of Hay Creek at Hay Creek School, for 1913.

(Drainage area, 30 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	43.00	0.10	7.650	0.2550	0.284	455
May	1.42	0.10	0.312	0.0100	0.012	19
June	0.45	0.01	0.079	0.0030	0.003	5
July	0.07	0.04	0.043	0.0010	0.001	3
August	0.02	0.00	0.006	0.0002	0.000	0
The period					0.300	482

HAY CREEK AT FAUQUIER'S RANCHE.

This station was established on April 22, 1909, by F. T. Fletcher. It is located on the N.E. ¼ Sec. 30, Tp .10, Rge. 25, W. 3rd Mer., about seven miles southeast of Maple Creek. It is situated below the intake of H. Fauquier's irrigation ditch, and also below the intake of the Maple Creek waterworks. Hence, records of flow obtained at this station do not represent the total discharge of the stream. The flow of springs below the Maple Creek waterworks intake, together with drainage, and the overflow from the Maple Creek waterworks give a continuous flow in the creek above the station. This flow, which is very largely the overflow from the Maple Creek waterworks, varies greatly, depending upon the consumption of water by the town of Maple Creek and by the Canadian Pacific Railway. The disappearance of water before reaching this station is explained in part, by the fact that Mr. Fauquier diverts water into his irrigation ditch. The remainder of the water must seep through the gravel of the creek bed before it reaches this station. The fact springs break out a short distance below the gauge and give a continuous flow (so far as is known) seems to bear out the seepage theory.

The gauge, which is a plain staff graduated to feet and hundredths, is fixed to a post at the left bank. The zero of the gauge (elev. 91.39) is referred to a permanent iron bench mark (assumed elev. 100.00) sunk in the left bank about 30 feet southwest of the gauge.

The channel is straight for 100 feet above and 200 feet below the station. Both banks are high and not liable to overflow. The bed of the stream is composed of sand and coarse gravel and is liable to shift at high stages. The current is sluggish during low water but is very swift at high stages.

Discharge measurements are made near the gauge by wading and at very low stages a weir is used. The initial point for soundings is a square stake driven close to the ground on the left bank, marked "I.P."

During 1913, the gauge was read by Miss M. Fauquier.

No water was diverted by Mr. Fauquier's ditch during the season of 1913.

DISCHARGE MEASUREMENTS of Hay Creek at Fauquier's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 12	J. S. Wright	11.0	12.02	0.998	1.44	12.0
May 29	E. W. W. Hughes					Nil.
July 23	do					Nil.
Oct. 3	do					Nil.
Oct. 23	do					Nil.

Daily Gauge-height and Discharge of Hay Creek, at Fauquier's Ranche, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.09	22.00	0.71	1.01	Dry	Nil.	Dry.	Nil.
2	1.84	18.30	0.81	2.20	"	"	0.50	"
3	1.71	16.30	0.90	3.50	"	"	0.49	"
4	1.80	17.70	0.80	2 10	"	"	0.50	"
5	1.80	17.70	0.74	1.34	"	"	Dry.	"
6	1.94	19.90	0.70	0.90	"	"	"	"
7	1.83	18.20	0.71	1.01	"	"	"	"
8	1.71	16.30	0.72	1.12	"	"	"	"
9	1.41	11.50	0.75	1.45	"	"	"	"
10	1.65	15.30	0.69	0.80	"	"	"	"
11	1.72	16.40	0.67	0.60	"	"	"	"
12	1.33	10.20	0.65	0.40	"	"	"	"
13	1.35	10.50	0.64	0.34	"	"	"	"
14	1.37	10.80	0.70	0.90	"	"	"	"
15	1.40	11.30	0.75	1.45	"	"	"	"
16	1.10	6.50	0.75	1.45	"	"	"	"
17	1.05	5.80	0.68	0.70	"	"	"	"
18	0.89	3.40	0.64	0.34	"	"	"	"
19	0.86	2.90	0.60	0.10	"	"	"	"
20	0.84	2.70	0.59	0.09	"	"	"	"
21	0.80	2.10	0.51	0.01	"	"	"	"
22	0.69	0.80	0.40	Nil.	"	"	"	"
23	0.70	0.90	0 40	"	"	"	"	"
24	0.65	0.40	Dry.	"	"	"	"	"
25	0.60	0.10	"	"	"	"	"	"
26	0.56	0.06	"	"	0.60	0.10	"	"
27	0.55	0.05	"	"	Dry.	Nil.	"	"
28	0.60	0.10	"	"	"	"	"	"
29	0.71	1.01	"	"	"	"	"	"
30	0.72	1.12	"	"	"	"	"	"
31	"	"	"	"			*a*	"

a Creek was dry for balance of the year.

Monthly Discharge of Hay Creek at Fauquier's Ranche, for 1913.

(Drainage area, 32 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	22.0	0.05	8.680	0.271	0.302	516
May	3.5	0.00	0.703	0.022	0.025	43
June	0.1	0.00	0.003	0.000	0.000	Nil.
July						Nil.
August						Nil.
September						Nil.
October						Nil.
The period					0.327	559

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Hay Lake drainage baisn, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per Sec.*	*Sec.-ft.*
May 30....	M. H. French.... E.W.W. Hughes.	Maple Creek, Pipe Line.....	S. E.20-10-25-3...	.....	.....	.....	0.870
May 30....	do	do	do ...	.....	.....	.....	0.957
July 4...	E.W.W. Hughes	do	do ...	.....	.....	.....	0.840
Aug. 12....	do	do	do ...	.....	.....	.....	0.700
Oct. 24....	M. H. French... H.D.St.A.Smith. E.W.W. Hughes.	do	do ...	.....	.....	.....	0.593
Nov. 19....	do	do	do ...	.....	.....	.....	0.514
Oct. 24....	do	do	N.W. 11-11-26-3.	.....	.....	.....	0.509
May 30....	M. H. French... E.W.W. Hughes.	Saunder's Springs..	S.E. 20-10-25-3...	.....	.....	.....	0.888
May 30....	do	do ..	do ...	.....	.....	.....	0.975
July 4....	E.W.W. Hughes	do ..	do ...	.....	.....	.....	0.863
Aug. 12....	do	do ..	do ...	.....	.....	.....	0.718
Oct. 24....	M. H. French... H.D. St.A.Smith. E.W.W. Hughes.	do ..	do ...	.....	.....	.....	0.593
Nov. 19....	do	do ..	do ...	.....	.....	.....	0.523
Dec. 10....	O. H. Hoover...	do ..	do ...	.....	.....	.....	0.632
Dec. 30....	F. R. Steinberger	do ..	do ...	.....	.....	.....	0.470
Dec. 9....	O. H. Hoover...	Spring Creek.	S.E. 10-10-25-3.	.....	.....	.....	0.176
Dec. 30....	F.R. Steinberger.	do ..	do ...	.....	.....	.....	0.090

BIG STICK LAKE DRAINAGE BASIN.

General Description.

Big Stick is one of the largest lakes in the northern Cypress Hills district. It is situated about township 15, range 25, west of the 3rd meridian, and covers an area of 35 square miles. The lake is alkaline in character and has no outlet.

The only source of supply of the lake is Maple Creek which its tributary Gap Creek rises in the Cypress Hills thrity miles south. On the south and east the lake is bounded by the Sand Hills. The drainage area is 820 square miles.

The topography of the drainage basin is for the most part gently rolling and the creek slope is small except near the source. The basin is bare of trees except in the hills. The channel is flat, wide and in most places sandy.

The spring break-up in 1913 took place about March 28th. This was the only flood of importance during the year. No damage of any extent was caused by floods.

There are several small irrigation ditches in the basin.

MAPLE CREEK AT MAPLE CREEK.

This station was established May 9, 1908, by R. J. Burley. It is located at the highway bridge just north of the Canadian Pacific Railway tracks in the town of Maple Creek, on the road allowance east of the N.E. ¼ Sec. 16, Tp. 11, Rge. 26, W. 3rd Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is attached vertically to a pile on the upstream side of the bridge. The zero of the gauge (elev. 92.83) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank at the west road fence, 37½ feet west and 13 feet south of the southeast corner of the bridge.

The channel is straight for 200 feet above and 100 feet below the station. Both banks are comparatively low and will overflow at high-water stages of the stream. The bed of the stream is composed of sand and may shift during flood stages. The current is moderate at high and sluggish at low stages of the stream.

During high water discharge measurements are made from the downstream side of the bridge. The initial point for soundings is the face of the right or south abutment, and is marked by "O" in white paint on the bridge beam. During ordinary stages, discharge measurements are made about fifty feet downstream from the gauge by wading, and at low stages a weir is used. The bridge is not at right angles to the current and measurements from the bridge must be corrected.

During 1913, the gauge was read by Miss Kate William.

Discharge Measurements of Maple Creek at Maple Creek, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 9	H. D. ST. A Smith	39.3	59.90	0.89	3.04	53.40
April 12	do	38.8	54.00	0.74	2.74	39.80
May 1	do	16.0	9.05	0.92	1.57	8.38
July 3	do				0.40	a
July 26	do				0.35	b
Aug. 19	do					c
Sept. 4	do					c
Sept. 30	do					c
Oct. 22	do					c
Nov. 15	do					c
Nov. 15	do					c

a Flow too small to measure.
b Creek standing in pools.
c Creek dry.

Daily Gauge-height and Discharge of Maple Creek, at Maple Creek, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
1	3.55	102.0	1.58	9.5	1.05	1.77	0.57	0.02
2	3.35	79.0	1.58	9.5	1.05	1.77	0.60	0.04
3	2.76	40.0	1.84	14.6	1.05	1.77	0.65	0.12
4	2.61	35.0	1.77	13.1	1.03	1.62	0.61	0.06
5	2.89	44.0	1.60	9.9	1.05	1.77	0.58	0.03
6	5.02	32.80	1.57	9.3	1.05	1.77	0.58	0.03
7	3.80	138.0	1.54	8.8	1.05	1.77	0.58	0.03
8	3.18	63.0	1.49	7.8	1.05	1.77	0.58	0.03
9	2.89	44.0	1.48	7.6	0.78	0.40	0.58	0.03
10	2.96	48.0	1.49	7.8	0.65	0.12	0.70	0.21
11	3.16	62.0	1.49	7.8	0.57	0.02	0.68	0.17
12	2.89	44.0	1.49	7.8	0.57	0.02	0.68	0.17
13	2.88	44.0	1.49	7.8	0.58	0.03	0.58	0.03
14	3.43	88.0	1.49	7.8	0.58	0.03	0.58	0.03
15	3.48	94.0	1.52	8.4	0.58	0.03	0.58	0.03
16	2.57	33.0	1.55	9.0	0.58	0.03	0.58	0.03
17	2.33	26.0	1.57	9.3	0.58	0.03	0.58	0.03
18	2.21	23.0	1.52	8.4	0.58	0.03	0.58	0.03
19	2.01	18.5	1.49	7.8	0.58	0.03	0.58	0.03
20	2.04	19.2	1.46	7.2	0.78	0.40	0.58	0.03
21	1.85	14.8	1.41	6.4	1.08	2.00	0.58	0.03
22	1.76	13.0	1.38	5.9	1.53	8.60	0.58	0.03
23	1.57	9.3	1.36	5.6	1.55	9.00	0.58	0.03
24	1.58	9.5	1.32*b*	5.1	1.55	9.00	0.58	0.03
25	1.55	9.0	1.29	4.7	1.58*b*	9.50	0.58	0.03
26	1.49	7.8	1.19	3.4	1.62	10.30	0.58	0.03
27	1.49	7.8	1.16	3.0	1.62	10.30	0.58	0.03
28	1.46	7.2	1.16	3.0	1.60	9.90	0.58	0.03
29	1.52*b*	8.4	1.08	2.0	1.12	2.50	0.58	0.03
30	1.58	9.5	1.05	1.77	0.58	0.03	0.58	0.03
31			1.05	1.77			0.58	0.03*c*

b Gauge height interpolated.
c Creek dry from July 31 to end of year.

Monthly Discharge of Maple Creek at Maple Creek, for 1913.

(Drainage area, 87 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	328.00	7.20	49.00	0.560	0.620	2,975
May	14.60	1.77	7.16	0.082	0.090	440
June	10.30	0.02	2.88	0.033	0.040	171
July	0.21	0.02	0.048	0.001	0.001	3a
The period					0.751	3,589

a Creek dry from July 31 to the end of the year.

MAPLE CREEK NEAR MAPLE CREEK.

This station was established on May 4, 1910, by H. R. Carscallen. It is one mile and a half north of the town of Maple Creek, at the highway bridge east of the S. E. ¼ Sec. 28, Tp. 11, Rge. 26, W. 3rd Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to a pile in the middle of the downstream side of the bridge. The zero of the gauge (elev. 81.60) is referred to a permanent iron bench mark (assumed elev. 100.00), situated at the west road fence, 100 feet south and 29 feet west of the southeast corner of the bridge.

The channel is straight for 100 feet above and 10 feet below the gauge. Both banks are high, sandy and not liable to overflow. The bed is sandy and liable to shift.

Discharge measurements are made during high stages with a current meter from the downstream side of the bridge. The initial point for soundings is the face of the left abutment and is marked on the side of the bridge beam by "O" in white paint. The current is not at right angles to the cross section and a correction is applied to the area. During ordinary stages gaugings are made upstream by wading, and during low stages a weir is used.

During 1913, the gauge was read by Miss Kate Williams.

Discharge Measurements of Maple Creek near Maple Creek, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 9	H. D. St. A. Smith	32.4	58.50	0.60	4.26	35.20
April 12	do	35.0	67.30	0.74	4.42	49.70
April 30	do	13.0	6.00	0.91	3.15	5.45
May 23	do	10.5	3.52	0.72	2.90	2.52
June 9	do				2.48	a 0.21
June 30	do	8.0	1.36	0.28	2.50	0.38
July 28	do				2.50	a 0.30
Aug. 19	do				2.50	a 0.37
Sept. 6	do				2.45	a 0.22
Sept. 30	do				2.40	....b
Oct. 22	do				1.49	....b

a Weir measurement.
b Discharge too small to measure.

Daily Gauge-height and Discharge of Maple Creek, near Maple Creek, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	5.27	175.0	3.19	5.30	2.59	0.75
2	6.07	163.0	3.11	4.30	2.59	0.75
3	5.59	132.0	3.40	8.00	2.57	0.65
4	5.38	118.0	3.38	7.70	2.55	0.55
5	5.22	109.0	3.23	5.80	2.51	0.37
6	6.95	218.0	3.19	5.30	2.40	0.10
7	5.58	131.0	3.16	4.90	2.40	0.10
8	4.59	68.0	3.13	4.60	2.40	0.10
9	4.27	37.0	3.19	5.30	2.40	0.10
10	4.18	31.0	3.17	5.00	2.40	0.10
11	4.39	46.0	3.17	5.00	2.40	0.10
12	4.27	37.0	3.17	5.00	2.40	0.10
13	4.22	33.0	3.15	4.80	2.70	1.30
14	4.40	47.0	3.15	4.80	2.70	1.30
15	4.30	39.0	3.17	5.00	2.70	1.30
16	4.17	31.0	3.19	5.30	2.62	0.90
17	3.93	20.0	3.21	5.50	2.50	0.55
18	3.78	15.8	3.16	4.90	2.50	0.55
19	3.58	11.1	3.12	4.40	2.42	0.14
20	4.39	46.0	3.08	4.00	2.42	0.14
21	4.38	45.0	3.01	3.30	2.44	0.17
22	3.30	6.6	2.90	2.50	2.46	0.22
23	3.23	5.8	2.94	2.70	2.46	0.22
24	3.14	4.7	2.89*a*	2.40	2.46	0.22
25	3.10	4.2	2.85	2.20	2.56*a*	0.60
26	3.07	3.8	2.80	1.90	2.66	1.10
27	3.00	3.2	2.73	1.48	2.66	1.10
28	3.00	3.2	2.70	1.30	2.64	1.00
29	3.10*a*	4.2	2.66	1.10	2.62	0.90
30	3.20	5.4	2.59	0.75	2.60	0.80
31	.....	.....	2.59	0.75	.....	.....

a Gauge height interpolated.

Daily Gauge-height and Discharge of Maple Creek, near Maple Creek, for 1913. —*Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.57	0.65	2.50	0.33	2.40	0.10	2.14	0.03
2	2.53	0.46	2.50	0.33	2.40	0.10	2.09	0.02
3	2.58	0.70	2.48	0.27	2.40	0.10	1.90	0.01
4	2.54	0.51	2.45	0.19	2.40	0.10	1.90	0.01
5	2.51	0.37	2.40	0.10	2.40	0.10	1.84	0.01
6	2.57	0.65	2.40	0.10	2.40	0.10	1.81	0.01
7	2.53	0.46	2.40	0.10	2.40	0.10	1.78	0.01
8	2.55	0.55	2.40	0.10	2.40	0.10	1.70	0.01
9	2.55	0.55	2.40	0.10	2.40	0.10	1.64	Nil.
10	2.56*a*	0.60	2.40	0.10	2.40	0.10	1.60	"
11	2.57	0.65	2.40	0.10	2.40	0.10	1.60	"
12	2.51	0.37	2.40	0.10	2.40	0.10	1.60	"
13	2.51	0.37	2.40	0.10	2.40	0.10	1.60	"
14	2.51	0.37	2.40	0.10	2.40	0.10	1.60	"
15	2.51	0.37	2.40	0.10	2.40	0.10	1.60	"
16	2.51	0.37	2.40	0.10	2.40	0.10	1.60	"
17	2.51	0.37	2.40	0.10	2.40	0.10	1.54	"
18	2.51	0.37	2.40	0.10	2.40	0.10	1.50	"
19	2.51	0.37	2.40	0.10	2.40	0.10	1.50	"
20	2.50	0.33	2.40	0.10	2.40	0.10	1.50	"
21	2.50	0.33	2.40	0.10	2.40	0.10	1.50	"
22	2.50	0.33	2.40	0.10	2.40*a*	0.10	1.48	"
23	2.50	0.33	2.40	0.10	2.40	0.10	1.48	"
24	2.50	0.33	2.40	0.10	2.38	0.09	1.47	"
25	2.50	0.33	2.40	0.10	2.36	0.08	1.47	"
26	2.50	0.33	2.40	0.10	2.36	0.08	1.47	"
27	2.50	0.33	2.40	0.10	2.32	0.06	1.47	"
28	2.50	0.33	2.40	0.10	2.29	0.05	1.47	"
29	2.50	0.33	2.40	0.10	2.27	0.04	1.47	"
30	2.50	0.33	2.40	0.10	2.20	0.03	1.47	"
31	2.50	0.33	2.40	0.10	. . .	. .	1.47	"

a Gauge heights interpolated.

Monthly Discharge of Maple Creek near Maple Creek, for 1913.

(Drainage area, 95 square miles.)

Month.	Discharge in Second-Feet.			Run-Off.		
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	218.00	3.20	53.130	0.559	0.624	3,160
May	8.00	0.75	4.040	0.042	0.048	248
June	1.30	0.10	0.539	0.006	0.007	32
July	0.70	0.33	0.421	0.004	0.005	26
August	0.33	0.10	0.123	0.001	0.001	8
September	0.10	0.03	0.088	0.001	0.001	5
October	0.03	0.00	0.003	0.000	0.000	.....
The period					0.686	3,479

GAP CREEK AT SMALL'S RANCHE.

This station was established April 25, 1909, by F. T. Fletcher. It is located on the S.E. ¼ Sec. 4, Tp. 10, Rge. 27, W. 3rd Mer., 1,000 feet west of the surveyed trail from Maple Creek to Tennile police detachment, and about twelve miles south of Maple Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to a post sunk in the bed of the stream at the right bank. It is situated at the road allowance between Secs. 3, and 4, Tp. 10, Rge. 27, W. 3rd Mer., and is just above the point where McShane Creek joins Gap Creek. The zero of the gauge (elev. 66.63) is referred to a permanent iron

bench mark (assumed elev. 100.00), situated at the McShane Creek bridge about 1,000 feet south of the gauge.

The channel is straight for 60 feet above and 500 feet below the station. The right bank is high and will not overflow except at very extreme flood stages; the left bank is much higher than the right and will not overflow at any stage of the stream. The bed of the stream is composed of loose, coarse gravel. The current is sluggish.

Discharge measurements are made at ordinary stages with a current meter by wading, and from a cable car at high stages. The initial point for soundings is a seven-eights inch iron pin on the right bank, 226 feet upstream from the gauge.

During 1913, the gauge was read by William Small.

DISCHARGE MEASUREMENTS of Gap Creek at Small's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 15	H. D. St. A. Smith	31.0	26.00	1.19	2.69	31.00
May 2	do	25.0	18.00	0.20	2.37	4.27
June 27	do	19.0	13.0	0.30	2.15	3.96
July 24	do	.....	.....	.....	.....	.....a
Aug. 30	do	.....	.....	.....	.....	.....a
Sept. 8	do	.....	.....	.....	.....	.....a
Sept. 9	do	.....	.....	.....	.....	.....a
Oct. 2	do	.....	.....	.....	.....	.....a
Oct. 25	do	.....	.....	.....	.....	.....a

a No flow, water standing in pools.

DAILY GAUGE-HEIGHT AND DISCHARGE of Gap Creek, at Small's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	2.23	3.30	1.99	0.15
2	.....b	.....	2.31	5.80	1.96	0.07
3	3.46	232.00	2.32	6.20	1.96	0.07
4	4.00a	378.00	2.34	6.90	1.96	0.07
5	4.50	513.00	2.31	5.80	1.96	0.07
6	3.85	338.00	2.28	4.80	1.96	0.07
7	3.05	122.00	2.27	4.40	1.96	0.07
8	2.74	39.00	2.27	4.40	1.96	0.07
9	2.77	46.00	2.30	5.40	1.96	0.07
10	2.85	68.00	2.30	5.40	1.96	0.07
11	2.90	81.00	2.28	4.80	1.96	0.07
12	2.91	84.00	2.28	4.80	1.96	0.07
13	3.02	113.00	2.25	3.80	1.96	0.07
14	2.87	73.00	2.28	4.80	1.96	0.07
15	2.75	41.00	2.31	5.80	1.96	0.07
16	2.61	24.00	2.31	5.80	1.96	0.07
17	2.59	22.00	2.33	6.50	1.96	0.07
18	2.48	13.90	2.29	5.10	1.96	0.07
19	2.42	10.00	2.22	3.06	1.96	0.07
20	2.37	8.20	2.20	2.50	1.97	0.10
21	2.35	7.30	2.17	1.90	1.96	0.07
22	2.31	5.80	2.14	1.36	1.94	0.04
23	2.24	3.50	2.10	0.80	1.92	0.02
24	2.21	2.80	2.10	0.80	1.91	0.01
25	2.17	1.90	2.09	0.72	1.91	0.01
26	2.13	1.22	2.06	0.50	2.36	7.70
27	2.11	0.94	2.04	0.37	2.30	5.40
28	2.15	1.50	2.00	0.17	2.22	3.00
29	2.22	3.00	1.99	0.15	2.18	2.10
30	2.23	3.30	1.99	0.15	2.12	1.08
31	.....	.....	1.99	0.15	.....	.....

a Gauge height interpolated.
b Ice jam Apr. 1 and 2.

DAILY GAUGE-HEIGHT AND DISCHARGE of Gap Creek, at Small's Ranche, for 1913.—*Concluded.*

DAY.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.05	0.42	1.86	Nil.*b*	1.84	Nil.*b*	1.80	Nil.*b*
2	2.06	0.49	1.86	"	1.84	"	1.80	"
3	2.04	0 37	1.86	"	1.84	"	1 78	"
4	2 32	6 20	1.86	"	1.84	"	1 78	"
5	2.28	4 80	1.86	"	1.83	"	1 78	"
6	2 20	2 50	1.86	"	1 83	"	1.76	"
7	2 12	1.08	1.86	"	1.83	"	1.76	"
8	2.09	0.72	1.86	"	1.83	"	1 76	"
9	2 00	0 17	1.86	"	1.83	"	1.74	"
10	2.00	0.17	1.88	"	1.83	"	1.74	"
11	2 02	0 27	1 87	"	1.83	"	1.74	"
12	2 02	0.27	1 87	"	1 83	"	1 72	"
13	2 03	0 32	1.87	"	1.83	"	1.72	"
14	1 97	0 10	1.86	"	1.83	"	1.70	"
15	1 96	0 07	1.86	"	1 83	"	1 70	"
16	1 94	0.04	1 86	"	1.83	"	1 68	"
17	1.94	0 04	1.86	"	1.83	"	1 68	"
18	1 93	0.03	1 92	"	1.83	"	1 66	"
19	1 92	0 02	1.89	"	1 83	"	1 66	"
20	1 91	0.01	1 86	"	1 83	"	1 62	"
21	1 90	Nil.*b*	1 86	"	1 82	"	1 62	"
22	1 90	"	1 86	"	1 82	"	1 60	"
23	1.89	"	1.86	"	1.80	"	1 60	"
24	1 88	"	1 86	"	1.80	"	1 60	"
25	1.87	"	1.86	"	1.80	"	1.58	"
26	1 86	"	1.86	"	1.80	"	1.58	"
27	1 86	"	1.86	"	1.80	"	1.58	"
28	1.86	"	1.86	"	1.80	"	1.59	"
29	1.86	"	1.86	"	1.80	"	1.60	"
30	1.86	"	1.85	"	1.80	"	1.62	"
31	1.86	"	1.84	"		"	1.64	"

b Water standing in pools.

MONTHLY DISCHARGE of Gap Creek at Small's Ranche, for 1913.

(Drainage area, 129 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (3-30)	513.00	0.94	79.000	0.619	0.640	4,437
May	6 90	0.15	3.400	0.026	0.030	211
June	7.70	0.01	0.698	0.005	0.006	42
July	6.20	0.00	0.583	0.001	0.005	36
August	0.02	0.00	0.001	0.000	0.000	Nil.
September						
October						
The period					0.6 1	4,726

c No flow from July 20 to end of year ,except for one day, August 18th.

MCSHANE CREEK AT SMALL'S RANCHE.

This station was established April 23, 1909, by F. T. Fletcher. It is located on the S.W. ¼ Sec. 3, Tp. 10, Rge. 27, W. 3rd Mer., at the highway bridge on the surveyed trail from Maple Creek to Tenmile police detachment, about 12 miles south of Maple Creek. It is about 600 feet above the mouth of the creek and about 500 feet from Wm. Small's house.

The gauge, which is a plain staff graduated to feet and hundredths, is attached firmly to the right abutment on the downstream side of the bridge. The zero of the gauge (elev. 85.21) is referred to a permanent iron bench mark (assumed elev. 100.00), located just east of the bridge upon the north side of the diversion of the road allowance. The bench-mark stands about four inches above ground and is protected with stones.

The channel is straight for 100 feet above and 200 feet below the station. Both banks are high and not liable to overflow. The bed of the stream is composed of coarse gravel and shifts at high stages. The current is swift.

Highwater measurements are made from the downstream side of the bridge. The initial point for soundings is the inner face of the right abutment of the bridge. Low water measurements are made near the gauge by wading and at very low stages a weir is used.

During 1913, the gauge was read by William Small.

The period of flow of this creek is short. It becomes dry usually in the month of June and remains so during the remainder of the season, except during the very heavy rains. Mr. Small diverted water above this station in 1913 during the month of May.

DISCHARGE MEASUREMENTS of McShane Creek at Small's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 14	H. D. St. A. Smith	13.0	6.61	0.52	1.12	3.40
May 2	do	8.5	3.67	0.96	1.09	3.20
June 5	do					a
June 27	do				0.80	b 0.08
July 24	do					a
Sept. 1	do					a
Sept. 9	do					a
Oct. 2	do					a
Oct. 25	do					a

a Creek dry.
b Weir measurement.

Daily Gauge-height and Discharge of McShane Creek, at Small's Ranche, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			0.95	1 57	Dry	Nil.	Dry.	Nil.
2	1.20	4.50	1.04	2 60	"	"	"	"
3	1.28*a*	5.56	1.04	2 60	"	"	"	"
4	1.84*a*	13.20	0.98	1 90	"	"	1.21	4 6
5	1.92	14.00	0.94	1 46	"	"	0.89	0.93
6	1 27	5.40	0.92	1 25	"	"	0.70	0.00
7	1 17	4.10	1.00	2.10	"	"	Dry.	Nil.
8	1.26	5.30	1.00	2 10	"	"	"	"
9	1 00	2.10	0.99	2 00	"	"	"	"
10	1 22	4.80	1.00	2 10	"	"	"	"
11	1.18	4.30	0.98	1.90	"	"	"	"
12	1.17	4.10	0.94	1 46	"	"	"	"
13	1.26	5.30	0.90	1 04	"	"	"	"
14	1.21	4.60	0.98	1 90	"	"	"	"
15	1.18	4 30	1.00	2 10	"	"	"	"
16	1.12	3 50	0.95	1.57	"	"	"	"
17	1.11	3.40	1.04	2.60	"	"	"	"
18	1.03	2.50	0.95	1.57	"	"	"	"
19	0.96	1 68	0.91	1.15	"	"	"	"
20	0.93	1.36	0.88	0.83	"	"	"	"
21	0.90	1.04	0.84	0.44	"	"	"	"
22	0.72	0.00	0.75	0.00	"	"	"	"
23	0.50	0.00	0.26	0.00	"	"	"	"
24	Dry.	Nil.	Dry	Nil.	"	"	"	"
25	"	"	"	"	"	"	"	"
26	"	"	"	"	1.18	4.30	"	"
27	"	"	"	"	0.84	0.44	"	"
28	0.92	1.25	"	"	Dry.	Nil.	"	"
29	0.94	1.46	"	"	"	"	"	"
30	0.95	1.57	"	"	"	"	"	"
31	.....	.....			"	"	"	"

Monthly Discharge of McShane Creek at Small's Ranche, for 1913.

(Drainage area, 24 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (2-30)	14.0	0.00	3.40	0.142	0.153	197
May	2.6	0.00	1.17	0.049	0.056	72
June	4.3	0.00	0.16	0.007	0.008	10
July	4.6	0.00	0.18	0.008	0.009	11*a*
August						*b*
September						*b*
October						*b*
The period					0.226	290

a Creek running July 4–6 only.
b Creek dry from July 7 to end of year.

GAP CREEK NEAR MAPLE CREEK.

This station was established on May 3, 1910, by H. R. Carscallen. It is located at the traffic bridge on the road allowance east of the N.E. $^1/_4$ Sec. 31, Tp. 11, Rge. 26, W. 3rd Mer. about four and a half miles northwest of the town of Maple Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the right abutment on the downstream side of the bridge. The zero of the gauge (elev. 81.61) is referred to a permanent iron bench mark (assumed elev. 100.00), situated 95 feet east of the northeast corner of the bridge.

The channel is straight for about 130 feet above the station and 60 feet below. The left bank is high and the right low, but not liable to overflow. The bed is sandy and shifts during flood stages.

During high water, discharge measurements are made from the bridge, and during ordinary stages by wading. The initial point for soundings is marked on the north end of the bridge in red paint. The bridge is not at right angles to the direction of the current and a coefficient is applied to the measured discharge to obtain the actual discharge. The discharge is determined in extreme low water by means of a weir.

During 1913 the gauge was read by Miss Kate Williams.

Discharge Measurements of Gap Creek near Maple Creek, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 12	H. D. St. A. Smith	42.0	59.50	1.54	2.87	91.00
April 30	do	a 8.0	2.50	1.62	1.49	4.10
May 23	do	a 8.5	3.09	1.10	1.42	3.70
June 6	do				1.26	b 0.12
July 26	do					*c*
Aug. 19	do					*d*
Sept. 4	do					*d*
Sept. 30	do					*d*
Oct. 21	do					*d*
Nov. 15	do					*d*

a Width, etc. refers to wading section.
b Weir measurement.
c Too small to measure.
d No flow; water standing in pools.

Daily Gauge-height and Discharge of Gap Creek, near Maple Creek, for 1913.

Day.	April.		May.		June.		July.		August.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.92	294.0	1.54	5.80	1.30	0.75	1.28	0.51	1.21	0.03
2	4.20	222.0	1.50	4.80	1.29	0.63	1.27	0.39	1.21	0.03
3	3.45	147.0	1.70	10.50	1.28	0.51	1.26	0.27	1.20	Nil. b
4	2.98	111.0	1.67	9.60	1.27	0.39	1.26	0.27		
5	2.98	111.0	1.66	9.30	1.26	0.27	1.26	0.27		
6	4.92	194.0	1.60	7.50	1.25	0.15	1.25	0.15		
7	4.42	244.0	1.59	7.20	1.25	0.15	1.25	0.15		
8	4.26	228.0	1.57	6.60	1.25	0.15	1.25	0.15		
9	2.86	90.0	1.57	6.60	1.24	0.12	1.25	0.15		
10	2.66	72.0	1.57	6.60	1.24	0.12	1.25	0.15		
11	a 2.65	72.0	1.57	6.60	1.24	0.12	1.24	0.12		
12	2.65	72.0	1.57	6.60	1.24	0.12	1.24	0.12		
13	2.66	72.0	1.57	6.60	1.24	0.12	1.24	0.12		
14	2.64	71.0	1.58	6.90	1.24	0.12	1.24	0.12		
15	2.61	68.0	1.58	6.90	1.24	0.12	1.23	0.12		
16	2.58	65.0	1.59	7.20	1.24	0.12	1.23	0.09		
17	2.39	50.0	1.59	7.20	1.24	0.12	1.23	0.09		
18	2.22	38.0	1.58	6.90	1.24	0.12	1.23	0.09		
19	2.04	27.0	1.54	5.80	1.24	0.12	1.23	0.09		
20	1.86	17.5	1.51	5.00	1.27	0.39	1.23	0.09		
21	1.84	16.5	1.46	3.80	1.27	0.39	1.22	0.06		
22	1.82	15.5	1.43	3.10	1.24	0.12	1.22	0.06		
23	1.67	9.6	1.38	2.10	1.24	0.12	1.22	0.06		
24	1.58	6.9	a 1.36	1.70	1.24	0.12	1.22	0.06		
25	1.53	5.5	1.34	1.35	1.24	0.12	1.22	0.06		
26	1.49	4.5	1.34	1.35	1.24	0.12	1.21	0.03		
27	1.49	4.5	1.34	1.35	1.24	0.12	1.21	0.03		
28	1.46	3.8	1.34	1.35	1.24	0.12	1.21	0.03		
29	a 1.50	4.8	1.33	1.20	1.24	0.12	1.21	0.03		
30	1.54	5.8	1.32	1.05	1.27	0.39	1.21	0.03		
31			1.31	0.90			1.21	0.03		

a Gauge height interpolated.
b No flow, water standing in pools from August 3rd to end of year.

Monthly Discharge of Gap Creek near Maple Creek, for 1913.

(Drainage area, 295 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	294.0	3.80	81.400	0.276	0.3100	4,844
May	10.5	0.90	5.140	0.017	0.0200	316
June	0.75	0.12	0.215	0.0007	0.0008	13
July	0.51	0.03	0.129	0.0004	0.0005	8
August	0.03	0.00	0.002			
The period					0.3313	5,181

a No run-off from Aug. 3 to end of year.

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Bigstick Lake drainage basin in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per Sec.*	*Sec.-ft.*
May 22....	H.R. Carscallen .	Cypress Creek.	S.W.17-9-27-3...	.....	.....	.....	*a*0.79
May 21....	L. B. Tillson....	Maple Creek.....	N.W. 23-14-26-3.	9.0	4.21	0.705	2.97
May 21....	do	Mitchell's Ditch...	N.E. 23-14-26-3..	12.0	11.36	0.654	7.43
May 21....	do	do	do .	13.0	13.60	0.587	7.97
May 21....	do .	do ..	do . .	9.0	9.49	0.767	7.28

a Weir measurement.

MANY ISLAND LAKE DRAINAGE BASIN.

General Description

Many Island Lake, about 25 square miles in area, is situated on the boundary line between the provinces of Alberta and Saskatchewan about ten miles north of the town of Walsh. It is the farthest west of the several lakes which receive the drainage of the north slope of the Cypress Hills. The water is shallow and alkaline. Its only source of water supply is Mackay Creek with its tributaries, Stony and Boxelder Creeks.

The topography of the basin is very rough and the creek slopes are heavy. The basin is bare of trees except in the hills near the sources of the streams. The creek channels are deep and the beds are mostly gravel.

The spring breakup in 1913 took place about April 1st. As is the case with all prairie streams, the highest discharges took place at this period. All the streams of this drainage basin stopped running in June or July and remained so for the remainder of the season.

In the lower part of the drainage basin near the lake, irrigation has been developed to some extent on hay meadows. In the upper part there are few irrigation schemes.

EAST BRANCH OF MACKAY CREEK AT GRANT'S RANCHE.

This station was established on October 13, 1911, by M. H. French. It is located in the N.W. ¼ Sec. 36, Tp. 10, Rge. 1, W. 4th Mer., about 100 feet north of Arthur Grant's house. It is about five miles south of Walsh and one mile above the junction of the east and west branches of Mackey Creek.

The gauge, which is a plain staff graduated to feet and hundredths is nailed to a post sunk in the bed of the stream near the right bank. The zero of the gauge (elev. 75.85) is referred to a permanent iron bench mark (assumed elev. 100.00), situated on the right bank, in line with the cross section and 100 feet from the initial point.

The channel is straight for 50 feet above and below the station. The right bank is a cut bank and will never overflow. The left bank is rather low, covered with brush, and will overflow in extreme floods. The bed of the channel is composed of coarse gravel and will not shift.

Discharge measurements are made with a current meter by wading. The initial point for soundings is the face of a five inch stake on the right bank, ten feet from the water's edge, and is well protected by a mound of stones. The final point is a willow stump on the left bank, 45.1 feet from the inital point and protected by a mound of stones.

During 1913, the gauge was read by A. D. Grant.

Discharge Measurements of East Branch Mackay Creek at Grant's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 3	H. D. St. A. Smith	18.5	20.70	1.02	1.37	21.30
June 10	do				0.40	[a]
July 4	do	8.0	1.98	0.21	0.51	0.41
July 29	do					[b]
Sept. 3	do					[b]
Sept. 26	do					[b]
Oct. 18	do					[b]
Nov. 13	do					[b]

a Water standing in pools.
b Creek dry.

Daily Gauge-height and Discharge of East Branch Mackay Creek, at Grant's Ranche, for 1913.

Day.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1 77	39 0	1 05	10 00	0 55	0 65	0 61	1.02
2	1 58	31 0	1.15	13 80	0 55	0 65	0 56	0.71
3	1 55	30 0	1 30	20 00	0 53	0 55	0 51	0.45
4	1 62	33 0	1 22	16 70	0 50	0 40	0 51	0.45
5	1 63	33 0	1 11	12 20	0 47	0 31	0 57	0.77
6	3 19	98 0	1 07	10 70	0 43	0 21	0 66	1.39
7	1 85	42 0	1 12	12 60	0 41	0 17	0 63	1.16
8	1 69	36 0	1 13	13 00	0 39	0 13	0 51	0.45
9	1 66	35 0	1 12	12 60	0 35	0 05	0 39	0.13
10	1 85	42 0	1 05	10 00	0 32	0 02	0 35	0.05
11	2 23	58 0	1 11	12 20	0 32	0 02	0 34	0.04
12	2 66	76 0	1 13	13 00	0 30	Nil.	0 35	0.05
13	2 46	68 0	1 02	9 00	0 30		0 32	0.02
14	2 12	54 0	1 07	10 70	0 30		0 31	0.01
15	1 75	38 0	1 21	16 30	0 30		0 30	Nil.
16	1 93	46 0	1 11	12 20	0 30		0 30	
17	1 49	28 0	1 05	10 00	0 30		0 30	
18	1 51	29 0	1 05	10 00	0 30		0 30	
19	1 47	27 0	0 97	7 40	0 30		0 30	
20	1 45	26 0	0 93	6 20	0 30		0 30	
21	1 40	24 0	0 89	5 30	Dry.		Dry.	[a]
22	1 26	18 1	0 83	3 90				
23	1 11	12 2	0 81	3 50				
24	0 96	7 1	0 81	3 50				
25	0 92	6 0	0 77	2 70				
26	0 90	5 5	0 71	1 88				
27	0 91	5 8	0 71	1 88				
28	0 90	5 5	0 70	1 75	0 71	1 88		
29	0 90	5 5	0 61	1 02	0 67	1.48		
30	1 01	8 6	0 56	0 71	0 63	1.16		
31			0 53	0 55				

a Creek dry from July 21 to end of year.

Monthly Discharge of East Branch Mackay Creek at Grant's Ranche, for 1913.

(Drainage area, 77 square miles.)

Month.	Discharge in Second-Feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	98.00	5.50	32.000	0.419	0.456	1,919
May	20.00	0.55	8.600	0.111	0.128	526
June	1.88	0.00	0.256	0.003	0.003	15
July	1.39	0.00	0.216	0.004	0.004	13*a*
August						*a*
September						*a*
October						*a*
The period					0.591	2,473

a Creek dry from July 21 to end of year.

WEST BRANCH MACKAY CREEK AT SCHNELL'S RANCHE.

This station was established October 12, 1911, by M. H. French. On September 20, 1912, it was moved six miles downstream by G. R. Elliott. It is located on the N. E. ¼ Sec. 27, Tp. 10, Rge. 1, W. 4th Mer., and is two miles above the junction with East Branch Mackay Creek and seven miles south of the village of Walsh.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a well braced post sunk in the bed of the stream at the left bank. The gauge is 126 feet S. 57° E. from ¼ mound on the north boundary of Sec. 27, Tp. 10, Rge. 1, W. 4th Mer. The zero of the gauge (elev. 91.66) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank 104 feet north of the gauge.

The channel curves above and below the gauge. The right bank is low and covered with brush and liable to overflow. The left bank is high and covered with bushes and not liable to overflow. The bed is composed of clean, coarse gravel, liable to shift.

Discharge measurements are made with a current meter by wading and by the weir method in low water. The initial point for soundings is a five inch stake marked "I.P." in red paint, located on the left bank 34 feet from the gauge in line with the iron bench mark. The final point is 66.8 feet from the initial point and is a five inch stake marked "F.P." in red paint.

During 1913 the gauge was read by Christian Schnell.

Discharge Measurements of West Branch McKay Creek at Schnell's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 4	H. D. St. A. Smith	8.0	2.13	1.00	1.43	3.12
June 10	do				0.89	*a*
July 4	do				0.60	*a*
July 29	do					*b*
Sept. 3	do					*b*
Sept. 26	do					*b*
Oct. 17	do					*b*
Nov. 13	do					*b*

a Water standing in pools.
b Creek dry.

DAILY GAUGE-HEIGHT AND DISCHARGE of West Branch Mackay Creek, at Schnell's Ranche, for 1913.

DAY.	April.		May.		June.		July.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.72	6.20	1.11	Nil.	1.00	*a*Nil.	0.45	*a*Nil.
2	1.89	8.10	1.32	1.94	1.00	"	0.51	"
3	1.84	7.60	1.32	1.94	1.00	"	0.47	"
4	1.94	8.60	1.44	3.20	1.00	"	0.47	"
5	2.10	10.40	1.40	2.80	0.99	"	0.36	"
6	2.60	15.80	1.32	1.94	0.98	"	0.24	"
7	2.27	12.20	1.34	2.20	0.97	"	0.10	"
8	1.82	7.30	1.26	1.29	0.96	"	Dry.	Nil.
9	1.88	8.00	1.32	1.94	0.95	"	"	"
10	1.92	8.40	1.30	1.72	0.90	"	"	"
11	1.84	7.60	1.27	1.40	0.83	"	"	"
12	1.80	7.10	1.24	1.07	0.85	"	"	"
13	1.86	7.80	1.25	1.18	0.77	"	"	"
14	1.68	5.80	1.40	2.80	0.68	"	"	"
15	1.60	5.00	1.46	3.10	0.65	"	"	"
16	1.58	4.70	1.45	3.30	0.78	"	"	"
17	1.62	5.20	1.34	2.20	0.79	"	"	"
18	1.51	4.00	1.27	1.40	0.53	"	"	"
19	1.54	4.30	1.24	1.07	0.42	"	"	"
20	1.46	3.40	1.21	0.75	0.39	"	"	"
21	1.44	3.20	1.17	0.32	0.31	"	"	"
22	1.37	2.50	1.14	*a*Nil.	0.24	"	"	"
23	1.31	1.83	1.12	"	0.21	"	"	"
24	1.28	1.50	1.09	"	0.30	"	"	"
25	1.24	1.07	1.08	"	0.40	"	"	"
26	1.20	0.64	1.07	"	0.92	"	"	"
27	1.16	0.21	1.06	"	0.91	"	"	"
28	1.11	*a*Nil.	1.05	"	0.94	"	"	"
29	1.14	"	1.02	"	0.67	"	"	"
30	1.11	"	1.01	"	0.54	"	"	"
31			1.00	"			"	"

a Water standing in pools.

MONTHLY DISCHARGE of West Branch of Mackay Creek at Schnell's Ranche, for 1913.

(Drainage area, 96 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	15.80	0.00	5.28	0.055	0.061	314*a*
May	3.40	0.00	1.22	0.013	0.015	75*b*
June						
July						....*d*
August						
September						
October						
The period					0.076	389

a Creek standing in pools, April 28-30.
b Creek standing in pools, May 22-31.
d Creek standing in pools.
e Creek dry.

MACKAY CREEK AT WALSH.

This station was established on July 29, 1909, by F. T. Fletcher. It is located at the traffic bridge one half mile south of the C.P.R. track at Walsh, and is on the N. W. ¼ Sec.26, Tp. 11, Rge. 1, W. 4th Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to an upright timber on the upstream side of the bridge near the right abutment. The zero of the gauge (elev. 88.92) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank on the downstream side of the bridge and 77.5 feet from the gauge.

The channel is straight for about 225 feet above and 500 feet below the station. Both banks are clean and are liable to overflow during high stages. The bed is clean, composed of clay and is not liable to shift. The current is sluggish.

During high water, discharge measurements are made from the downstream side of the bridge. At low stages, the discharge is measured by wading, and at extreme low water a weir is used.

During 1913 the gauge was read by G. G. Sept.

DISCHARGE MEASUREMENTS of Mackay Creek at Walsh, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 15	F. R. Steinberger	34.0	54.00	0.99	2.25	54.00
May 3	H. D. St. A. Smith	15.0	12.30	1.14	1.24	13.90
May 8	F. R. Steinberger	13.0	12.40	1.23	1.29	15.20
May 29	do	9.0	1.65	0.57	0.60	0.95
June 20	do				Dry.	Nil.
July 10	do				do	do
July 24	do				do	do
Aug. 20	do				do	do
Sept. 11	do				do	do
Sept. 30	do				do	do
Oct. 21	do				do	do

Daily Gauge-height and Discharge of MacKay Creek, at Walsh, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.88	82.0	1.08	9.90	0.46	0.29
2	2.22	53.0	1.03	8.60	0.37	0.12
3	1.92	40.0	1.26	14.60	0.36	0.11
4	2.31	56.0	1.38	18.20	0.32	0.08
5	2.11	48.0	1.29	15.40	0.24	0.04
6	2.59	69.0	1.13	11.20	0.14	0.02
7	2.80	78.0	1.13	11.20	0.04	Nil.
8	2.60	69.0	1.25	14.30		"
9	1.84	36.0	1.22	13.50		"
10	2.08	46.0	1.17	12.20		"
11	2 10	47.0	1.16	12.00		"
12	3 24	98.0	1 14	11.40		"
13	3 08	90.0	1.13	11.20		"
14	2 81	78.0	1.21	13.30		"
15	2 60	69.0	1.39	18.50		"
16	2.26	54.0	1.35	17.20		"
17	2.41	61.0	1.19	12.70		"
18	1.86	37.0	1.15	11.70		"
19	1.80	35.0	1.09	10.10		"
20	1.74	32.0	1.01	8.10		"
21	1.63	28.0	0.94	6.40		"
22	1.45	20.0	0.94	6.40		"
23	1.32	16.3	0.92	5.90		"
24	1.11	10.7	0.84	4.30		"
25	1.03	8.6	0.76	3.00		"
26	0.95	6.6	0.74	2.70		"
27	0.90	5.5	0.72	2 40		"
28	0.90	5.5	0.66	1.62	0.44	0.24
29	0.91	5.7	0.62	1.20	0.31	0.07
30	1.04	8.8	0.54	0.56	0.19	0.03
31			0.46	0.29		....*a*

a No flow after June 30th.

Monthly Discharge of Mackay Creek at Walsh, for 1913.

(Drainage area, 205 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	98.00	5.50	43.100	0.2300	0.2300	2,565
May	18.50	0.29	9.360	0.0460	0.0500	576
June	0.29	0.00	0.033	0.001	0.0001	2
July						Nil.
August						Nil.
September						Nil.
October						Nil.
The period					0.2801	3,143

BOXELDER CREEK AT YOUNG'S RANCHE.

This station was established May 24, 1910, by P. M. Sauder. It is located at John Young's farm on the N. E. ¼ Sec. 2, Tp. 12, Rge. 30, W. 3rd Mer., and is two miles east of Walsh.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to a post at the right bank. The zero of the gauge (elev. 88.83) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank 65 feet from the gauge and 113 feet from Mr. Young's house.

The stream flows in one channel, which curves both above and below the gauge. The banks are high and not liable to overflow. The bed of the stream is composed of clay.

Discharge measurements are generally made by wading at or near the gauge, but during floods it is measured from the Canadian Pacific Railway bridge a few hundred feet below the gauge.

During 1913, the gauge was read by John Young.

DISCHARGE MEASUREMENTS of Boxelder Creek at Young's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 15	F. R. Steinberger	16.0	15.8	0.61	1.92	10.9
May 8	do				Dry.	Nil.
May 29	do				do	do
June 20	do				do	do
July 10	do				do	do
July 24	do				do	do
Aug. 20	do				do	do
Sept. 11	do				do	do
Sept. 30	do				do	do
Oct. 21	do				do	do

DAILY GAUGE-HEIGHT AND DISCHARGE of Boxelder Creek, at Young's Ranche, for 1913.

Day.	April.		May.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.10	31.00	Dry.	Nil. *a*
2	3.25	23 00	"	"
3	2.65	17.50	0.60	0.80
4	2.60	17.10	0.60	0.80
5	2.32	14.60	0.75	1.60
6	2.48	16.00	0.65	1.05
7	3.52	25.00	0.50	0.30
8	3.40	24.00	0.40	0.00
9	3 42	24.00	Dry.	Nil *a*
10	2.15	13.00	"	"
11	1.40	6.40	"	"
12	1.08	3.80	0.65	1.05
13	1.15	4.40	0.70	1.30
14	2.20	13 50	0.75	1.60
15	1.98	11.50	0.70	1.30
16	1.45	6.80	0.55	0.55
17	1.48	7.10	0.50	0.30
18	1.82	10.10	0 40	0.00
19	1.68	8 80	. . .	Nil *a*
20	1.32	5 80	. . . . .	"
21	1.05	3.60	. . . . .	"
22	0.80	1 90	. . . .	"
23	0.70	1 30	. . .	"
24	0 62	0 90	.	"
25	0 60	0 80	. . . .	"
26	0 60	0 80	. . . . .	"
27	0 50	0 30	. . . . .	"
28	0 00	Nil. *a*	.	"
29	Dry.	"	Dry.	*b*
30	"	"	"	"
31			"	"

a Water standing in pools.
b Creek dry from May 29th to end of season.

Monthly Discharge of Boxelder Creek at Young's Ranche, for 1913.

(Drainage area, 100 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April.....	31.00	0.00	9.770	0.098	0.110	581
May.....	1.60	0.00	0.344	0.003	0.003	21
June.....						Nil.
July.....						Nil.
August....						Nil.
September						Nil
October....						Nil.
The period...					0 113	602

ROSS CREEK DRAINAGE BASIN.

General Description.

Ross Creek rises in Elkwater Lake, a small body of water covering an area of approximately two square miles, situated in township 8, range 3, west of the fourth meridian. The creek flows in a northerly direction as far as Irvine and then turns sharply to the west and closely parallels the main line of the Canadian Pacific Railway to Medicine Hat. Here it is joined by Sevenpersons River and the combined flow empties into the South Saskatchewan in section 32, township 12, range 5, west of the fourth meridian. The tributaries of Ross Creek are Bullshead Creek, which joins it in section 21, township 12, range 5, west of the fourth meridian, and Grosventre Creek, which joins it in section 14, township 11, range 3, west of the fourth meridian.

The topography of this basin is exceedingly rough and rolling and almost totally devoid of tree growth. The one exception is a small area of the Forest Reserve just south of Elkwater Lake, which has a good stand of pine and spruce.

The Canadian Pacific Railway takes the water supply for its tank at Irvine from Ross Creek.

ROSS CREEK AT ROBINSON'S RANCHE.

This station was established on October 11, 1911, by M. H. French. It is located on the N.W. ¼ Sec. 24, Tp. 9, Rge. 3, W. 4th Mer., about 30 miles southeast of Medicine Hat.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream near the right bank; it is 720 feet S. 29° E. of the northeast corner Sec. 23, Tp. 9, Rge. 3, W. 4th Mer. The zero of the gauge (elev. 93.12) is referred to a permanent iron bench mark (assumed elev. 100.00) seven feet from the initial point for soundings and in line with the regular cross section.

The channel is straight for about 75 feet above and 50 feet below the station. Both banks are high enough to carry all stages of the stream. The bed of the stream is composed of very coarse gravel and will not shift. The fall of the stream at this point is very great. Water runs here all summer, but at the lowest stage the flow ceases a short distance below owing to seepage and evaporation.

Discharge measurements are made at ordinary stages eighteen feet downstream from the gauge with a current meter by wading and at very low stages with a weir. The initial point for soundings is a five inch stake on the right bank 56 feet from the water's edge. It is painted red and is protected by a mound of stones. The final point for soundings is a stake on the left bank 103.2 feet from the initial point.

During 1913, the gauge was read by James Robinson.

Discharge Measurements of Ross Creek at Robinson's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 5	H. D. St. A. Smith	16.3	7.73	1.11	1.60	8.61
June 11	do	7.0	1.71	0.41	1.23	0.70
July 5	do	14.0	6.15	0.75	1.49	4.63
July 30	do	8.0	2.28	0.36	1.25	0.83
Sept. 3	do	7.0	1.91	0.22	1.24	0.43
Sept. 26	do	7.0	1.90	0.28	1.27	0.54
Oct. 16	do	8.0	2.64	0.47	1.34	1.25
Nov. 11	do	11.0	3.67	0.47	1.42	1.73

Daily Gauge-height and Discharge of Ross Creek, at Robinson's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.70	57.0	1.67	11.7	1.38	2.30
2	2.74	59.0	1.61	9.1	1.36	1.91
3	2.83	63.0	1.58	7.8	1.34	1.60
4	2.90	66.0	1.55	6.6	1.33	1.47
5	3.26	82.0	1.60	8.6	1.31	1.20
6	3.02	71 0	1.58	7 8	1.30	1.06
7	2.82	62.0	1.56	7.0	1.29	1.00
8	2.79	61.0	1.54	6.2	1.27	0.89
9	2.75	59.0	1.52	5.6	1.24	0.74
10	2.84	63.0	1.50	4.9	1.22	0.65
11	2.76	60.0	1.50	4.9	1.23	0.68
12	2.65	55 0	1.50	4.9	1.25	0.78
13	2.58	52.0	1.50	4 9	1.25	0.78
14	2.52	49 0	1.55	6 6	1.26	0.84
15	2.45	46 0	1.60	8.6	1.27	0.89
16	2.42	45.0	1.60	8.6	1.27	0.89
17	2.66	55.0	1.62	9.5	1.28	0.95
18	2.62	54.0	1.58	7 8	1.27	0.89
19	2.58	52.0	1.55	6.6	1.27	0.89
20	2.52	49.0	1.53	5.9	1.28	0.95
21	2.45	46 0	1.53	5.9	1.28	0.95
22	2.36	42.0	1.51	5.2	1.30	1.06
23	2.21	35.0	1.50	4 9	1.33	1.47
24	2.10	31.0	1 50	4.9	1 37	2.20
25	1.95	21.0	1.47	4.1	1.46	3.90
26	1.80	17.4	1.44	3.4	1.56	7.00
27	1.74	14 8	1.43	3.2	1.58	7.80
28	1.68	12.1	1.42	3.0	1.58	7.80
29	1.64	10.4	1.42	3.0	1.50	4.90
30	1.62	9.5	1.42	3.0	1.47	4.10
31	.....	.....	1.40	2.6	.....	.....

Daily Gauge-height and Discharge of Ross Creek, at Robinson's Ranche, for 1913. *Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*
1	1.47	4.10	1.24	0.74	1.27	0.89	1.28	0.68
2	1.49	4.60	1.23	0.69	1.25	0.48	1.28	0.68
3	1.53	5.90	1.23	0.69	1.26	0.55	1.28	0.68
4	1.49	4.60	1.23	0.69	1.26	0.55	1.28	0.68
5	1.47	4.10	1.23	0.69	1.26	0.55	1.29	0.75
6	1.44	3.40	1.23	0.69	1.26	0.55	1.31	0.90
7	1.35	1.74	1.23	0.69	1.26	0.55	1.34	1.14
8	1.29	1.00	1.30	1.06	1.27	0.62	1.38	1.51
9	1.25	0.78	1.28	0.95	1.27	0.62	1.41	1.84
10	1.31	1.20	1.31	1.20	1.27	0.62	1.36	1.32
11	1.29	1.00	1.27	0.89	1.27	0.62	1.35	1.22
12	1.25	0.78	1.24	0.74	1.27	0.62	1.36	1.32
13	1.23	0.69	1.24	0.74	1.27	0.62	1.38	1.51
14	1.40	2.60	1.28	0.95	1.27	0.62	1.39	1.60
15	1.37	2.20	1.27	0.89	1.27	0.62	1.40	1.70
16	1.35	1.74	1.26	0.84	1.27	0.62	1.41	1.84
17	1.30	1.06	1.24	0.74	1.27	0.62	1.35	1.22
18	1.24	0.74	1.50	4.90	1.26	0.55	1.31	0.90
19	1.24	0.74	1.45	3.60	1.29	0.75	1.33	1.06
20	1.24	0.74	1.40	2.60	1.27	0.62	1.32	0.98
21	1.24	0.74	1.35	1.74	1.27	0.62	1.31	0.90
22	1.30	1.06	1.29	1.00	1.32	0.98	1.31	0.90
23	1.27	0.89	1.27	0.89	1.34	1.14	1.31	0.90
24	1.25	0.78	1.26	0.84	1.30	0.82	1.83*a*	12.00
25	1.24	0.74	1.24	0.74	1.27	0.62	2.31	26.00
26	1.24	0.74	1.24	0.74	1.28	0.68	1.70	8.20
27	1.24	0.74	1.25	0.78	1.27	0.62	1.36	1.32
28	1.23	0.69	1.25	0.78	1.28	0.68	1.31	0.90
29	1.24	0.74	1.24	0.74	1.28	0.68	2.51	32.00
30	1.25	0.78	1.27	0.89	1.28	0.68	1.81	11.40
31	1.24	0.74	1.27	0.89	.....	.....	1.56	4.40

a High gauge height Oct. 24 to 31 due to open headgates at Elkwater Lake.

Monthly Discharge of Ross Creek at Robinson's Ranche, for 1913.

(Drainage area 36 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	82.00	9.50	46.700	1.300	1.45	2,779
May	11.70	2.60	6.000	0.166	0.19	369
June	7.80	0.65	2.080	0.058	0.06	121
July	5.90	0.69	1.690	0.047	0.05	104
August	4.90	0.69	1.130	0.031	0.04	69
September	1.14	0.48	0.658	0.018	0.02	39
October	32.00	0.68	3.950	0.110	0.13	243*a*
The period	.....	.....	.....	.....	1.94	3,727

a High discharges, Oct. 24 to 31, due to opening of headgates at Elkwater Lake.

GROSVENTRE CREEK AT TOTHILL'S FARM.

This station was established on October 10, 1911, by M. H. French. It is located beside Tothill's house in the S. E. ¼ Sec. 27, Tp. 9, Rge. 4, W. 4th Mer., about 28 miles southeast of Medicine Hat.

The gauge, which is a plain staff graduated to feet and hundreths, is nailed to a post sunk in the bed of the stream near the right bank and is 755 feet N. 60° W. of the northeast corner of Sec. 21, Tp. 9, Rge. 4, W. 4th Mer. The zero of the gauge (elev. 83.89) is referred to a permanent iron bench mark (assumed elev. 100.00, situated on the right bank.

The channel is straight for fifty feet above and 100 feet below the station. The right bank is very high and brush covered. The left bank is low and produces a wide channel at high stages. The bed of the stream is coarse gravel and is not liable to shift.

Discharge measurements are made during high stages with a current meter by wading at a point about 18 feet downstream from the gauge. The initial point for soundings is the face of a four inch stake driven in the left bank against a large rock and marked "I. P." in knife cuts. At low stages gaugings are made with a weir, 88 feet downstream from the gauge.

During 1913, the gauge was read by Mrs. Kate Tothill.

Discharge Measurements of Grosventre Creek at Tothill's Farm, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 5	H. D. St. A. Smith	13.5	5.69	0.33	0.74	1.870
June 11	do					a
July 5	do				0.54	b 0.174
July 30	do					a
Sept. 2	do					a
Sept. 24	do					a
Oct. 16	do					a
Nov. 10	do				0.62	b 0.245

a Creek dry.
b Weir measurement.

Daily Gauge-height and Discharge of Grosventre Creek, at Tothill's Farm, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.03	85.00	0.75	1.95	0.44	0.04
2	1.83	67.00	0.67	0.67	0.40	Nil.
3	1.81	65.00	0.75	1.95	0.38	"
4	1.91	74.00	0.72	1.47	0.32	"
5	2.43	119.00	0 69	1.03	0.31	"
6	2.12	92.00	0.71	1.31	Dry.	"
7	1.83	67.00	0.67	0.67	"	"
8	1.63	50.00	0 71	1.32	"	"
9	1.41	32 00	0.75	1 95	"	"
10	1.39	30.00	0.71	1.32	"	"
11	1.13	33.00	0.71	1.32	"	"
12	1.33	26.00	0.73	1 63	"	"
13	1.31	25.00	0.78	2 50	"	"
14	1 21	18.40	1.00	8.50	"	"
15	1.00	8.50	0.92	5.80	"	"
16	1 13	14.10	0.91	5 50	"	"
17	0 99	8 20	0 89	5.00	"	"
18	0 92	5.80	0 83	3.50	"	"
19	0.83	3 50	0 76	2.10	"	"
20	0 82	3 30	0.73	1.63	"	"
21	0.77	2 30	0 70	1.15	"	"
22	0.77	2 30	0.68	0 91	"	"
23	0 65	0.55	0 66	0.67	"	"
24	0.61	0 31	0 64	0.49	"	"
25	0.59	0.23	0.62	0 37	"	"
26	0 53	0 13	0.59	0 23	"	"
27	0 53	0 13	0 58	0.21	0.67	0.67
28	0 55	0.15	0.56	0.17	0.70	1.15
29	0 64	0.49	0 56	0 17	0.65	0.55
30	0 62	0.37	0.52	0 12	0.59	0.23
31			0 50	0 10		

Daily Gauge-height and Discharge of Grosventre Creek, at Tothill's Farm, for 1913.

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.53	0.13	Dry.	Nil.	Dry.	Nil.	Dry.	Nil.
2	0.52	0.12	"	"	"	"	"	
3	0.50	0.10	"	"	"	"	"	
4	0.54	0.14	"	"	"	"	"	
5	0.56	0.17	"	"	"	"	"	
6	0.52	0.12	"	"	"	"	"	
7	0.44	0.04	"	"	"	"	"	
8	0.37	0 00	"	"	"	"	"	
9	Dry.	Nil.	"	"	"	"	"	
10	"	"	"	"	"	"	"	
11	"	"	"	"	"	"	"	
12	"	"	"	"	"	"	"	
13	0.40	0.00	"	"	"	"	"	
14	0.37	0.00	"	"	"	"	"	
15	Dry.	Nil.	"	"	"	"	"	
16	"	"	"	"	"	"	"	
17	"	"	"	"	"	"	"	
18	"	"	"	"	"	"	"	
19	"	"	"	"	"	"	"	
20	"	"	"	"	"	"	"	
21	"	"	"	"	"	"	"	
22	"	"	"	"	"	"	"	
23	"	"	"	"	"	"	"	
24	"	"	"	"	"	"	"	
25	"	"	"	"	"	"	"	
26	"	"	"	"	"	"	"	
27	"	"	"	"	"	"	0.38	"
29	"	"	"	"	"	"	0.42	0.02
29	"	"	"	"	"	"	0.43	0.03
30	"	"	"	"	"	"	0.41	0 01
31	"	"	"	"	"	"	0.45	0 05

Monthly Discharge of Grosventre Creek at Tothill's Farm, for 1913.

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	119.00	0.13	27.800	1.740	1.940	1,654
May	8.50	0.10	1.800	0.112	0.129	111
June	1.15	0.00	0.088	0.006	0.007	5*a*
July	0.17	0.00	0.026	0.002	0.002	2*b*
August						
September						
October	0.05	0.00	0 004	0.000	0.000	.....*d*
The period					2.078	1,772

a Creek dry June 2-26.
b Creek dry July 7-31.
c Creek dry.
d Creek started running Oct. 28.

ROSS CREEK AT IRVINE.

This station was established on July 28, 1909, by F. T. Fletcher. It is located at the traffic bridge in the town of Irvine, on the N. W. ¼ Sec. 31, Tp. 11, Rge. 2, W. 4th Mer., about 400 yards below the Canadian Pacific Railway Company's dam.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to the downstream pile of the second row from the left abutment. The zero of the gauge (elev. 77.35) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the left bank of the creek 66.5 feet east of the end of the upstream handrail.

The stream flows in one channel, which is slightly curved for 75 feet above the station and almost straight for 600 feet below. The banks are composed of clay, and are high and not liable to overflow. The bed is composed of sand and gravel and may shift at high stages.

Discharge measurements are made from the downstream side of the bridge during high stages of the stream, and during low water it is waded. During extreme low water a weir is used.

During 1913, the gauge was read by H. E. Price.

DISCHARGE MEASUREMENTS of Ross Creek at Irvine, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-feet.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 15	F. R. Steinberger	17.0	26.80	1.55	2.30	43.00
April 17	do	17.0	32.40	1.65	2.62	53.00
May 8	do	13.0	9.51	1.05	1.41	10.00
May 29	do	7.5	1.47	0.18	0.78	0.26
June 20	do	1.0	0.10	0.41	0.70	0.41
July 10	do	3.4	0.34	0.22	0.69	0.08
July 24	do	3.4	0.44	0.19	0.70	0.08
Aug. 20	do	2.0	0.20	0.24	0.72	0.05
Sept. 11	do	.....	.....	.....	0.73	b 0.06
Sept. 30	do	.....	.....	.....	0.74	b 0.10
Oct. 21	do	.....	.....	.....	0.72	b 0.03

b Weir measurement.

DAILY GAUGE-HEIGHT AND DISCHARGE of Ross Creek, at Irvine, for 1913.

DAY.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	4.01	110.0	1.54	13.30	0.80	0.32
2	6.06	192.0	1.52	12.80	0.80	0.32
3	6.09	193.0	1.60	15.10	0.80	0.32
4	7.01	230.0	1.59	14.80	0.80	0.32
5	6.05	191.0	1.57	14.20	0.80	0.32
6	5.06	152.0	1.54	13.30	0.80	0.32
7	5.04	151.0	1.87	24.00	0.80	0.32
8	4.00	109.0	1.41	10.00	0.79	0.28
9	3.01	70.0	1.95	27.00	0.79	0.28
10	3.02	70.0	1.92	26.00	0.78	0.23
11	3.03	71.0	1.90	25.00	0.77	0.19
12	3.00	69.0	1.98	28.00	0.75	0.10
13	2.68	56.0	1.96	28.00	0.75	0.10
14	2.56	52.0	1.84	23.00	0.74	0.08
15	2.45	47.0	1.82	22.00	0.72	0.05
16	2.30	41.0	1.80	22.00	0.70	0.02
17	2.27	40.0	1.79	21.00	0.70	0.02
18	2.26	40.0	1.77	21.00	0.70	0.02
19	2.26	40.0	1.80	22.00	0.70	0.02
20	2.25	39.0	0.90*a*	1.12	0.70	0.02
21	1.97	28.0	0.90	1.12	0.70	0.02
22	1.97	28.0	0.85	0.67	0.70	0.02
23	1.88	25.0	0.85	0.67	0.70	0.02
24	1.79	21.0	0.85	0.67	0.70	0.02
25	1.75	20.0	0.80	0.32	1.00	2.20
26	1.70	18.3	0.80	0.32	1.40	9.80
27	1.67	17.3	0.80	0.32	1.35	8.60
28	1.63	16.1	0.78	0.23	1.20	5.60
29	1.60	15.1	0.75	0.10	1.10	3.80
30	1.58	14.5	0.80	0.32	1.10	3.80
31	.....	.....	0.80	0.32	.....	.....

a C. P. R. head gates at Elkwater Lake closed

Daily Gauge-height and Discharge of Ross Creek, at Irvine, for 1913.—*Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1 06	3 10	0 75	0 10	0 70	0 02	0 70	0 02
2	0 96	1.77	0 73	0.07	0 70	0 02	0 70	0 02
3	0 80	0.32	0 72	0 05	0 70	0 02	0 70	0 02
4	0.76	0.14	0 72	0.05	0 70	0 02	0 70	0.02
5	0.74	0.08	0 72	0 05	0 70	0 02	0 70	0.02
6	0 72	0 05	0 72	0.05	0 70	0 02	0 70	0 02
7	0 70	0.02	0.72	0 05	0 70	0 02	0 70	0 02
8	0 70	0 02	0 72	0 05	0 70	0 02	0 70	0 02
9	0 70	0 02	0 72	0.05	0 70	0 02	0 70	0.02
10	0.70	0.02	0.72	0 05	0 70	0 02	0.70	0.02
11	0 72	0 05	0 72	0 05	0 70	0 02	0 70	0 02
12	0 65	0.01	0 72	0.05	0 70	0 02	0 70	0 02
13	0.55	0.00	0 72	0 05	0 70	0 02	0 70	0 02
14	1 45	10.90	0 72	0.05	0.70	0 02	0 70	0.02
15	1 35	8 60	0.72	0 05	0 70	0 02	0 70	0.02
16	1 25	6 60	0 76	0 14	0 70	0 02	0 70	0 02
17	1 20	5 60	1 30	7 60	0 70	0 02	0 70	0.02
18	1.15	4 60	1 20	5 60	0 70	0 02	0 70	0.02
19	1 10	3 80	0 90	1 12	0 70	0 02	0 70	0.02
20	1 05	3 00	0 74	0 08	0 70	0 02	0 70	0.02
21	1.00	2 20	0 74	0 08	0 70	0 02	0 70	0.02
22	0.95	1.65	0 74	0.08	0 70	0 02	0 70	0.02
23	0.93	1.44	0.74	0 08	0 70	0 02	0 70	0.02
24	0 90	1.12	0 74	0 08	0 70	0.02	0 70	0.02
25	0.89	1 03	0 74	0 08	0 70	0 02	0.70	0.02
26	0 89	1 03	0 74	0 08	0 70	0 02	0 70	0.02
27	0 85	0 67	0 74	0 08	0 70	0.02	0 70	0.02
28	0 84	0.60	0 74	0 08	0 70	0 02	0 70	0.02
29	0 82	0 46	0 74	0 08	0 70	0.02	0.70	0.02
30	0 80	0 32	0 74	0 08	0 70	0 02	0 70	0.02
31	0 79	0 28	0 74	0 08			0 70	0.02

Monthly Discharge of Ross Creek at Irvine, for 1913.

(Drainage area, 251 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April	230.00	14.50	72.200	0.288	0.3200	4,296
May	28.00	0.10	12.500	0.050	0.0600	769
June	9.80	0.02	1.250	0.005	0.0060	74
July	10.90	0.00	1.920	0.008	0.0090	118
August	7.60	0 05	0.524	0.002	0.0020	32
September	0.02	0.02	0.020	0.0001	0.0001	1
October	0.02	0.02	0.020	0.0001	0.0001	1
The period	..	..			0.3972	5,291

BULLSHEAD CREEK AT CLARK'S RANCHE.

This station was established on October 9, 1911, by M. H. French. It is located at Clark's house in the N. W. ¼ Sec. 15, Tp. 9, Rge. 5, W. 4th Mer., about 25 miles south of Medicine Hat.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream near the left bank. The zero of the gauge (elev. 88.45) is refered to a permanent iron bench mark (assumed elev. 100.00), situated on the left bank 3300 feet N. 68° W. from the quarter mound on the east boundary of Sec. 15, Tp. 9, Rge. 5, W. 4th Mer.

The channel is curved for 100 feet above and straight for 200 feet below the gauge. Both banks are grassy and high and will not overflow. The bed is coarse gravel and is not liable to shift.

Discharge measurements at high stages are made with a current meter by wading. The intial point for soundings is the face of a four-inch stake, driven in the left bank 113 feet downstream from the gauge and marked "I.P." in knife cuts. At low stages measurements are made with a weir, 300 feet downstream.

During 1913, the gauge was read by W. E. Clark.

The headgate of Mrs. Clark's irrigation ditch is about a mile above this station. Water was diverted during the month of September.

DISCHARGE MEASUREMENTS of Bullshead Creek at Clark's Ranche, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 6	H. D. St. A. Smith	7.0	3.85	0.61	1.30	2.36
June 11	do	.....	.....	.....	.....	..... a
July 5	do	7.0	2.00	0.28	1.10	0.57
July 30	do	.....	.....	.....	.....	..... a
Sept. 2	do	.....	.....	.....	.....	..... a
Sept. 24	do	.....	.....	.....	1.05	b 0.05
Oct. 16	do	4.5	1.20	0.35	1.15	0.42
Nov. 10	do	5.5	1.51	0.45	1.18	0.68

a No flow, water standing in pools.
b Weir measurement.

DAILY GAUGE-HEIGHT AND DISCHARGE of Bullshead Creek, at Clark's Ranche, for 1913.

Day.	April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.10	38.00	1.21	1.03	1.05	0.06
2	3.00	140.00	1.30	2.40	1.05	0.06
3	3.50	236.00	1.30	2.40	1.06	0.08
4	3.75	292 00	1.30	2.40	1.04	0.05
5	4.25	420.00	1.30	2.40	1.02	0.04
6	3.97	343.0	1 25	1.54	1.02	0.04
7	3.50	236 0	1.25	1.54	1 02	0.04
8	3.50	236 00	1.25	1 54	1.01*a*	0.03
9	3.25	184.00	1.25	1 54	1.00*a*	0.02
10	2.54	78.00	1.25	1.54	0 98*a*	0.01
11	2.75	104.00	1.20	0 90	0 95*a*	0.00
12	2.75	104.00	1.20	0.90	0.95*a*	Nil.
13	2.75	104.00	1.22	1.16	0.95*a*	..
14	2.10	38.00	1.39	4.10	1.08	0.12
15	1.80	17.00	1.58	8.30	1.04	0.05
16	1.75	14.20	1.40	4 30	1.04*a*	0.05
17	1.75	14.20	1.38	4.0	1.10*a*	0.16
18	1.75	14 20	1.31	2.6	1.09*a*	0.14
19	1.55	7.40	1.29	2.10	1.08*a*	0.12
20	1.50	6.30	1.27	1.87	1.07	0.10
21	1.50	6.30	1.26	1.70	1.10	0.16
22	1.44	5.10	1.24	1.41	1.10	0.16
23	1.39	4.10	1.22	1.16	1.12	0.26
24	1.35	3.30	1.20	0 90	1.14	0.37
25	1.35	3.30	1.17	0 61	1.20	0 90
26	1.32	2.70	1.15	0.42	1.24	1.41
27	1.30	2.40	1.15	0 42	1.24	1.41
28	1.29	2.10	1.13	0.32	1.17	0.61
29	1.25	1.54	1.13	0.32	1.15	0.42
30	1.25	1.54	1.12	0.26	1.15	0.42
31	.....	.....	1.06	0 08	.....	.....

a Gauge height interpolated.

Daily Gauge-height and Discharge of Bullshead Creek, at Clark's Ranche, for 1913. *Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.11	0.21	.....	Nil.*b*	.....	Nil.*b*	1.08	0.12
2	1.10	0.16	.....	"	.....	"	1.08	0.12
3	1.10	0.16	.....	"	.....	"	1.08	0.12
4	1.10	0.16	.....	"	.....	"	1.08	0.12
5	1.10	0.16	.....	"	.....	"	1.08	0.12
6	1.07	0.10	.....	"	.....	"	1.08	0.12
7	1.04*a*	0.05	.....	"	.....	"	1.12	0.26
8	1.03*a*	0.04	.....	"	.....	"	1.14	0.37
9	1.02*a*	0.04	.....	"	.....	"	1.12	0.26
10	1.00*a*	0.02	.....	"	.....	"	1.13	0.32
11	0.95*a*	Nil.*b*	.....	"	.....	"	1.13	0.32
12	0.95*a*	"	.....	"	.....	"	1.13	0.32
13	0.95*a*	"	.....	"	.....	"	1.12	0.26
14	1.04	0.05	.....	"	.....	"	1.12	0.26
15	1.04	0.05	.....	"	.....	"	1.16	0.52
16	1.00*a*	0.02	.....	"	.....	"	1.18	0.71
17	0.95*a*	Nil.*b*	.....	"	.....	"	1.14	0.37
18	0.95*a*	"	1 46	5.50	.....	"	1.14	0.37
19	0.93*a*	"	1 19	0.80	.....	"	1.14	0.37
20	0.92*a*	"	1.09	0.14	.....	"	1.14	0.37
21	0.92*a*	"	1 04	0.05	.....	"	1.14	0.37
22	1.19	0.80	1 04	0.05	.....	"	1.19	0.80
23	1.23	1.28	1 04	0.05	1.19	0.80	1.19	0.80
24	1.21	1.03	0 95	Nil.*b*	1.09	0.14	1.19	0.80
25	1.13	0.32	.....	"	1.09	0.14	1.19	0.80
26	1.04	0.05	.....	"	1.08	0.12	1.19	0.80
27	1.00*a*	0.02	.....	"	1.08	0.12	1.19	0.80
28	0.95*a*	Nil.*b*	.....	"	1.08	0.12	1.19	0.80
29	0.95*a*	"	.....	"	1.08	0.12	1.19	0.80
30	0.95*a*	"	.....	"	1.08	0.12	1.19	0.80
31	0.95*a*	"	.....	"	.....	.....	1.19	0.80

a Gauge height interpolated.
b Water standing in pools.

Monthly Discharge of Bullshead Creek at Clark's Ranche, for 1913.

(Drainage area, 53 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April....	42.00	1.54	88.600	1.670	1.860	5,273
May.....	8.30	0.08	1.810	0.034	0.039	111
June.....	1.41	0.00	0.243	0.004	0.004	13
July.....	1.28	0.00	0.152	0.004	0.005	9
August....	5.50	0.00	0.212	0.004	0.005	13
September	0 80	0 00	0.056	0.001	0.001	3
October....	0.80	0.12	0.457	0.009	0.010	28
The period.					1.924	5,450

STARKS AND BURTON DITCH NEAR WOOLCHESTER.

This station was established on October 9, 1911, by W. A. Fletcher. It is located on the S. E. ¼ Sec. 17, Tp. 11, Rge. 5, W. 4th Mer., about 260 feet below the headgate of the ditch and ten miles south of Medicine Hat.

The gauge, which is a plain staff graduated to feet and inches, is nailed to a post at the right bank. The zero of the gauge (elev. 97.87) is referred to the top of a stake (assumed elev. 100.00), in the right bank and six feet upstream from the gauge.

The channel is straight for 250 feet above and 50 feet below the gauge. The cross section is uniform and the bed and banks are sandy.

Discharge measurements during high water are made with a current meter by wading. The initial point for soundings is the top of the bench mark. Ordinary discharge are measured with a weir.

Daily gauge heights were not obtained during 1913. The ditch flowed for about 10 days from April 28th to May 8th.

DISCHARGE MEASUREMENTS of Starks and Burton Ditch near Woolchester, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Inches.*	*Sec.-ft.*
May 7.....	H. D. St. A. Smith.....	7 0	2.12	1.42	7	3.10

BULLSHEAD CREEK NEAR DUNMORE.

This station was established July 26., 1909, by F. T. Fletcher. It is located at the traffic bridge on the S. E. ¼ Sec. 16, Tp. 12, Rge. 5, W. 4th Mer. It is four miles from Medicine Hat, and one mile above the junction of Ross and Bullshead Creeks.

The gauge, which is a plain staff graduated to feet and hundredths, is spiked to the upstream side of the left abutment. The zero of the gauge (elev. 89.48) is referred to a permanent iron bench mark (assumed elev. 100.00), located 15 feet south of left abutment of bridge.

The stream flows in one channel, which is straight for about 200 feet above and 450 feet below the station. The banks are high, clean and not liable to overflow. The bed is composed of sand and shifts.

During high water, discharge measurements are made from the bridge, but during low water the discharge is measured by wading, or by means of a weir.

A competent observer could not be secured during 1913, and there are therefore no records of the daily discharge.

DISCHARGE MEASUREMENTS of Bullshead Creek near Dunmore, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.--ft*
April 14.....	F. R. Steinberger.....	34.5	26.40	1.74	2.16	46.00
May 5.....	do	6.0	1.70	0.39	1.22	0.66
May 28.....	do	.....	.....	.....	.....	*a* 0.04
July 8.....	do	.....	.....	.....	Dry.	Nil.
July 19.....	do	.....	.....	.....	Dry.	Nil.
Aug. 19.....	do	.....	.....	.....	.....	*a* 0.26
Sept. 10.....	do	.....	.....	.....	Dry.	Nil.
Sept. 29.....	do	.....	.....	.....	Dry.	Nil.
Oct. 20.....	do	.....	.....	.....	.....	*a* 0.05

a Weir measurement.

SEVENPERSONS RIVER DRAINAGE BASIN.

General Description.

Sevenpersons River lies between the South Saskatchewan River and the Cypress Hills, and empties into the South Saskatchewan River at Medicine Hat. The drainage area consists mostly of open level prairie which has a small rainfall and a run-off confined chiefly to the spring freshet.

The creek has a considerable flow during the month of April but the discharge decreases to nil about June.

There are no irrigation works of importance on this stream and the records are valuable chiefly for statistical purposes.

SEVENPERSONS RIVER AT MEDICINE HAT.

This station was established on April 27, 1910, by H. R. Carscallen. It is located in the N. E. ¼ Sec. 30, Tp. 12, Rge. 5, W. 4th Mer., at the bridge on the road from Medicine Hat to Dunmore Junction and about one and a half miles east of the Canadian Pacific Railway station at Medicine Hat.

The gauge, which is a plain staff graduated to feet and hundredths, is attached to the east or right abutment of the bridge. The zero of the gauge (elev. 86.68) is referred to a permanent iron bench mark (assumed elev. 100.00), located 100 feet north of the mound and 64 feet northwest of the left abutment.

The channel is straight for about 100 feet above and below the station. Both banks are high and wooded. The stream bed is sandy and liable to change at high water.

During high water stages, discharge measurements are made with a current meter. The initial point of soundings is the inner face of the left abutment of the bridge. Low water measurements are made with a weir.

During 1913 the gauge was read by Chas. Pickering.

DISCHARGE MEASUREMENTS of Sevenpersons River at Medicine Hat, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 14	F. R. Steinberger	46.0	56.10	2.48	3.88	139.000
May 5	do	17.0	7.98	0.76	2.38	6.060
May 28	do	6.5	1.90	0.12	2.05	0.230
June 19	do	2.0	0.31	0.07	1.97	0.022
July 8	do				1.96	0.012
July 24	do				1.89	0. 05
Aug. 19	do				2.01	0.123
Sept. 10	do				Dry.	Nil.
Sept. 29	do				1.89	0.010
Oct. 20	do				2.05	0.193

Daily Gauge-height and Discharge of Sevenpersons River, at Medicine Hat, for 1913.

Day.	April.		May		June.		July.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			2.43	7.90	1.95	.01	2.08	.38		
2			2.43	7.90	1.90	.00	2.10	.50		
3	5.20	349.0	2.47	9.10	1.90	.00	1.99	.06		
4	5.26	359.0	2.43	7.90	1.85	.00	1.98	.05	a	
5	5.32	368.0	2.43	7.90	1.70	.00	1.95	.01	2.00	.07
6	5.40	381.0	2.43	7.90	1.60	.00	1.95	.01	2.01	.10
7	5.45	389.0	2.43	7.90	1.50	.00	1.95	.01	2.01	.10
8	5.52	400.0	2.43	7.90	1.40	.00	1.95	.01	2.01	.10
9	5.30	365.0	2.45	8.50	1.40	.00	1.93	.01	2.01	.10
10	4.61	255.0	2.45	8.50	1.45	.00	1.93	.01	2.00	.07
11	4.30	205.0	2.43	7.90	1.52	.00	1.91	.00	2.00	.07
12	4.10	173.0	2.43	7.90	1.56	.00	1.91	.00	2.01	.10
13	4.08	170.0	2.48	9.40	1.64	.00	a		2.01	.10
14	3.85	134.0	2.53	11.20	1.65	.00			2.01	.10
15	3.76	121.0	2.48	9.40	1.65	.00			2.01	.10
16	3.72	116.0	2.43	7.90	1.74	.00			2.01	.10
17	3.57	95.0	2.38	6.40	1.78	.00			2.00	.07
18	3.51	87.0	2.33	4.90	1.80	.00			2.00	.07
19	3.43	78.0	2.28	3.60	1.85	.00			2.00	.07
20	3.42	76.0	2.21	2.20	1.89	.00			2.00	.07
21	3.12	46.0	2.17	1.55	1.90	.00			2.00	.07
22	3.01	37.0	2.16	1.40	2.12	.80			2.00	.07
23	2.93	32.0	2.14	1.10	2.13	.95			2.00	.07
24	2.88	29.0	2.13	.95	2.15	1.25			2.00	.07
25	2.83	26.0	2.11	.65	2.23	2.60			2.00	.07
26	2.73	20.0	2.03	.14	2.16	1.40			2.00	.07
27	2.53	11.2	1.98	.05	2.14	1.10			2.00	.07
28	2.43	7.9	2.00	.07	2.10	.50			2.00	.07
29	2.43	7.9	2.00	.07	2.09	.44			2.00	.07
30	2.43	7.9	2.00	.07	2.09	.44			2.00	.07
31			2.00	.07					2.00	.07

a No observations July 13–Oct. 4.

Monthly Discharge of Sevenpersons River at Medicine Hat, for 1913.

(Drainage area, 442 square miles.)

Month.	Discharge in Second-Feet.			Run-Off.		
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (3-30)	400.0	7.90	155.20	.351	.36	8,619
May	11.20	.05	5.11	.012	.01	314
June	2.60	.00	.316	.001	.00	19
July (1-12)	.38	.00	.088	.000	.00	2
August (*a*)						
September						
October (5-31)	.10	.07	.080	.000	.00	4
The period					.37	8,958

a No observations in these months.

QU'APPELLE RIVER DRAINAGE BASIN.

General Description.

Qu'Appelle River rises in Township 23, Range 4, West of the Third Meridian, and flows eastward into the Assiniboine River in Township 28, Range 17, West of the First Meridian. These waters eventually find their way into Hudson's bay through the Red River, Lake Winnipeg and Nelson River.

The chief tributaries of Qu'Appelle River are Moosejaw Creek, Last Mountain Lake, Wascanna Creek and Loon Creek. Last Mountain is the largest lake in the basin, being some sixty miles long and from one to three miles wide.

The valley of the main stream is from two to three hundred feet deep, with a flat from one to three miles wide along the river. This flat is covered in many places with brush, and the side hills are in many places well wooded. The bench lands above the river are mostly level prairie, much of which is now under cultivation.

The mean annual rainfall at Moose Jaw is fourteen inches, at Regina fifteen inches, and at Indian Head nineteen inches. The streams are frozen during the winter months, and there is usually an abundant snow fall.

There are several irrigation and many industrial water rights in this basin.

QU'APPELLE RIVER AT LUMSDEN.

This station was established on May 12, 1911, by J. C. Keith. It is located at a private bridge on the premises of Mr. Jas. McEwan, on the N.W. ¼ Sec. 33, Tp. 19, Rge. 21, W. 2nd Mer., in the north end of the town of Lumsden; it is about three miles below the mouth of Wascana Creek and a little over a mile above the mouth of Boggy Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is fastened to the downstream side of the left abutment of the bridge. The zero of the gauge (elev. 85.33) is referred to a permanent iron bench mark (assumed elev. 100.00), located on the right bank of the river, 34 feet from the southeast corner of the bridge.

The channel is straight for 200 feet above and below the station. Both banks are fairly high but liable to overflow in an excessive flood. The bed of the stream is composed of gravel and is not likely to shift. The current is moderate.

Discharge measurements are made from the bridge during flood stages and by wading during low stages.

During 1913 the gauge was read by Jas. McEwen and J. G. Miller.

DISCHARGE MEASUREMENTS of Qu'Appelle River at Lumsden, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 24	O. H. Hoover.	17	27	00	1.75	Nil.
Mar. 15	do	27.5	22.9	1.15	3.86	26.0
Mar. 31	do	50	311 5	1.39	10.50	433.0
Apr. 16	do	27	259	1.50	8 32	390.0
May 14	do	27	137	0.62	4 24	85.4
June 10	do	27	122	0.24	3 17	29.2
July 8	do	27	132	0.012	3.78	15.7*a*
Aug. 23	do	27	125.3	0.29	3 62	37.0
Sept. 25	do	24	31.8	0.23	2 70	7.4
Oct. 8	do	24.1	33.5	0.30	2 66	10 0
" 31	do	23 0	20.6	0.301	2 52	6.0
Nov. 21	do	21.0	25.3	0.358	2.58	9.0
Dec. 23	F. R. Steinberger	14.0	9.26	0.234	2 17	2.2

a Not reliable.

Daily Gauge-height and Discharge of Qu'Appelle River, at Lumsden, for 1913.

Day.	January		February		March		April		May		June	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.96	2.7*a*	1.71	2.6	1.74	Nil.	11.40	807	4.48	103	3.97	66
2	1.96	2.4	1.75	2.0	1.70	"	11.38	805	4.39	96	4.11	76
3	1.95	2.2	1.75	1.7	1.74	"	10.48	706	4.41	100	4.15	79
4	1.92	2.5	1.72	1.7	1.69	"	9.60	609	4.45	101	3.92	62
5	1.92	2.6	1.71	1.8	1.75	"	8.69	509	4.51	106	3.82	55
6	1.90	2.4	1.71	2.0	1.69	"	4.58	607	4.52	107	3.91	62
7	1.85	2.1	1.70	2.0	1.71	"	9.76	627	4.53	107	3.66	46
8	1.86	1.7	1.68	2.0	1.76	1.0	11.02	765	4.29	88	3.52	39
9	1.86	1.3	1.68	2.3	1.77	2.2	9.95	648	4.21	83	3.28	28
10	1.81	1.0	1.70	2.8	2.13	5.5	9.30	576	4.15	79	3.19	25
11	1.81	0.5	1.70	3.1	4.90	137.0	9.35	582	4.17	80	3.53	40
12	1.80	Nil.	1.65	2.7	5.22	163.0	9.60	609	4.32	91	3.65	45
13	1.75	"	1.66	2.7	4.46	102.0	9.52	600	4.25	86	3.67	47
14	1.79	"	1.70	3.1	4.43	99.0	9.46	594	4.23	84	3.66	46
15	1.77	"	1.66	3.5	3.90	61.0	9.28	574	4.21	83	3.74	50
16	1.83	"	1.67	3.6	3.36	31.0	8.22	457	4.32	91	3.67	47
17	1.80	"	1.72	3.7	2.85	22.8	7.77	408	4.25	86	3.59	42
18	1.80	"	1.76	3.6	2.70	13.4	7.59	388	4.16	79	3.56	41
19	1.80	"	1.75	3.4	2.46	10.2	6.36	265	4.07	73	3.53	40
20	1.76	"	1.74	3.3	2.15	6.5	5.69	203	3.96	65	3.46	36
21	1.75	"	1.72	3.0	2.03	4.2	5.44	181	3.91	62	3.50	38
22	1.78	"	1.75	2.8	1.95	3.0	5.31	170	3.97	66	3.50	38
23	1.75	"	1.74	2.6	1.95	2.5	5.31	170	4.03	70	3.55	40
24	1.75	"	1.73	2.3	1.85	2.2	5.39	176	3.99	67	3.59	42
25	1.76	0.2	1.76	2.0	1.87	2.1	5.83	171	3.97	66	3.67	47
26	1.75	0.6	1.74	1.6	1.83	2.0	4.89	136	3.91	62	3.55	40
27	1.76	1.2	1.74	1.2	1.83	1.7	4.58	111	4.02	69	3.55	40
28	1.75	1.7	1.74	0.6	1.81	1.7	4.45	101	3.99	67	3.53	40
29	1.76	2.4	.....	.....	2.61	1.7	4.57	111	4.10	75	3.61	44
30	1.76	3.0	.....	.....	8.46	484.0*a*	4.61	174	4.03	70	3.73	50
31	1.74	3.4	.....	.....	10.68	728.0	.....	.....	4.15	79	.....	.....

a Jan. 1 to Mar. 30—ice conditions.

Daily Gauge-height and Discharge of Qu'Appelle River, at Lumsden, for 1913. *Concluded.*

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	3.52	39	3.32	30	3.17	24.0	2.73	9.6	2.53	6.1*a*	2.55	6.9
2	3.51	39	3.29	29	3.16	23.0	2.63	7.6	2.62	6.2	2.50	6.6
3	3.61	44	3.20	25	2.97	16.1	2.76	10.2	2.61	6.5	2.50	6.2
4	3.57	42	3.36	31	3.05	19.0	2.72	9.2	2.38	7.0	2.50	5.7
5	3.57	42	3.27	28	3.21	25.4	2.67	8.4	2.50	7.4	2.49	5.3
6	3.46	36	3.15	23	3.17	23.4	2.75	10	2.53	7.4	2.47	5.1
7	3.59	42	3.39	33	3.03	18.2	2.83	11.9	2.60	7.2	2.42	5.0
8	3.47	37	3.31	29	2.73	9.6	2.67	8.4	2.58	6.4	2.38	5.0
9	3.60	43	3.18	24	2.80	11.0	2.70	9.0	2.46	6.6	2.44	4.9
10	3.63	45	3.15	23	3.13	22.0	2.83	11.0	2.28	7.7	2.42	4.8
11	3.89	60	3.13	22	3.04	19.6	2.70	9.0	2.49	7.6	2.40	4.6
12	4.02	69	3.09	21	2.89	13.7	2.65	8.0	2.53	7.7	2.46	4.0
13	4.21	83	3.17	24	2.65	8.0	2.67	8.4	2.53	7.5	2.47	3.2
14	4.02	69	3.24	27	2.99	16.7	2.87	13.1	2.49	7.2	2.41	3.1
15	3.93	63	3.25	27	2.97	16.1	2.67	8.4	2.31	7.1	2.43	3.2
16	3.99	67	3.31	29	2.89	13.7	2.63	7.6	2.49	7.2	2.46	3.3
17	3.90	61	3.21	25	2.79	11.8	2.77	10.4	2.54	7.2	2.46	3.4
18	3.80	54	3.48	37	2.89	13.7	2.75	10.0	2.45	7.5	2.46	3.5
19	3.74	50	3.63	45	3.63	45.0	2.84	12.2	2.55	7.9	2.46	3.4
20	3.73	50	3.62	44	2.99	16.7	2.55	6.0	2.51	8.4	2.45	3.2
21	3.73	50	3.64	45	2.83	11.9	2.53	5.6	2.58	9.0	2.45	2.8
22	3.64	45	3.65	46	2.57	6.4	2.67	8.4	2.45	8.9	2.41	2.6
23	3.56	41	3.57	42	2.96	15.8	2.71	9.2	2.47	8.7	2.41	2.3
24	3.41	34	3.50	38	2.85	12.5	2.85	12.5	2.39	8.3	2.42	2.2
25	3.39	33	3.45	35	2.64	7.8	2.86	12.8	2.50	8.0	2.41	2.3
26	3.66	46	3.26	27	2.67	8.4	2.55	6.0	2.40	7.8	2.44	2.3
27	3.37	32	3.49	37	2.65	8.0	2.81	11.3	2.42	7.7	2.37	2.5
28	3.32	30	3.54	40	2.67	8.4	2.73	9.6	2.43	7.5	2.40	2.5
29	3.37	32	3.26	27	2.64	7.8	2.61	7.2	2.59	7.4	2.41	2.6
30	3.46	36	3.35	31	2.73	9.6	2.65	8.0	2.52	7.2	2.41	2.7
31	3.47	37	3.17	24	.....	.....	2.50	5.0	.....	.....	2.40	2.7*a*

a Nov. 1 to Dec. 31—ice conditions.

Monthly Discharge of Qu'Appelle River at Lumsden, for 1913.

(Drainage area, 6,160 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	3.4	0.0	10.90	0.0020	0.002	670
February	3.7	0.6	2.49	0.0004	0.000	138
March	163.0	0.0	60.90	.0090	0.010	3,745
April	807.0	101.0	428.00	0.0700	0.080	25,468
May	107.0	62.0	82.00	0.0130	0.014	5 042
June	79.0	25.0	46.40	0.0070	0.008	2,761
July	83.0	30.0	46.80	0.0070	0.008	2,878
August	46.0	21.0	31.20	0.0050	0.006	1,918
September	25.0	8.0	15.40	0.0020	0.002	916
October	13.1	5.0	9.16	0.0010	0.001	563
November	9.0	6.1	7.47	0.0010	0.001	444
December	6.9	2.2	3.80	0.0006	0.001	234
The year					0.133	44,777

MOOSEJAW CREEK DRAINAGE BASIN.

General Description.

Moosejaw Creek rises in the Yellowgrass marsh, which lies in townships 9 and 10, range 17, west of the second Meridian, and flows in a north and westerly direction until it reaches the city of Moose Jaw, where it is joined by Thunder Creek. From Moose Jaw it follows an easterly and northerly course, finally emptying into the Qu'Appelle River near Buffalo Pound Lake. From the headwaters to the city of Moose Jaw the drainage area is estimated at about 1830 square miles. This area is almost entirely devoid of tree growth, except in the vicinity of Moose Jaw, where the valley is lined with brush.

Throughout its entire length the creek flows in a very crooked but well defined channel. The upper portion of the valley is small, being merely a depression, but it gradually increases in size until at Drinkwater it is about thirty feet deep and at Moose Jaw about eighty feet deep. The fall in the creek is very small, and particularly so between Drinkwater and Moose Jaw, where the total fall is only 67.5 feet or an average of 2.3 feet per mile of valley.

The Canadian Pacific Railway Company has dams at Milestone, Rouleau, Drinkwater, two at Moose Jaw and one at Pasqua. There is also a municipality dam in Sec. 19 Tp. 15, Rge. 24, W. 2nd Mer., which supplies water to the neighbourhood during periods when there is no flow in the creek. In 1913 the Canadian Pacific Railway Company constructed a new dam to replace their present dam in Moose Jaw.

MOOSEJAW CREEK NEAR LANG.

This station was established on June 21, 1911, by J. C. Keith. It is located at the traffic bridge on the road allowance east of the N. E. $^1/_4$ Sec. 24, Tp. 11, Rge. 19, W. 2nd Mer., and is four miles west of the village of Lang.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the downstream face of the centre row of piles of the bridge. The zero of the gauge (elev. 95.04) is referred to a permanent iron bench mark (assumed elev. 100.00) located on the left bank of the stream 17 feet south of the last pile in the south approach of the bridge.

The channel is straight for 200 feet above and 150 feet below the station. Both banks are low and overflow in high stages of the stream. The bed of the stream is composed of clay, and in summer when the stream is very low becomes overgrown with vegetation. The current is sluggish at all stages.

Discharge measurements are made from the bridge in high stages of the stream and by wading or with a weir at some other section during low stages. The initial point for soundings at the bridge is the inner face of the south abutment.

The gauge was read during 1913 by Miss Irene Irvine.

DISCHARGE MEASUREMENTS of Moosejaw Creek near Lang, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 15	O. H. Hoover	35.3	46.90	0.32	2.14	15.20
May 7	do	12.5	4.03	0.31	1.56	1.50
June 3	do	1.6	.28	0.15	1.03	0.04
" 27	do	27.0	12.70	0.00	0.81	Nil.
July 29*a*	do	..			0.38	Nil.

a No discharge between July 29 and Oct. 31.

Daily Gauge-height and Discharge of Moosejaw Creek, near Lang, for 1913.

Day.	April.		May.		June.		July.		August.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft*	*.Feet.*	*Sec.-ft.*
1.			1.46	0.85	1.10	0.05	.81	Nil.	.16	Nil.
2.			1.46	.85	1.06	.03	.81	do	.10	do
3.			1.46	.85	1.09	.04	.80	do	.06	do
4.			1.46	.85	.98	0.00	.85	do	.03	do
5.			1.46	.85	.96	Nil. a	.88	do	.00	do
6.			1.41	.60	.95	do	.86	do	Dry.	do
7.			1.41	60	.93	do	.86	do	b	
8.			1.41	.60	.90	do	.86	do	do	
9.			1.41	.60	.87	do	.86	do	do	
10.			1.40	.55	.80	do	.85	do	do	
11.			1.40	.55	.80	do	.84	do		
12.			1.40	.55	.80	do	.80	do		
13.			1.39	.52	.89	do	.77	do		
14.			1.38	.49	.89	do	.75	do		
15.	2.14	15.2	1.37	.46	.85	do	.70	do		
16.	2.10	13.6	1.36	.43	.80	do	.70	do		
17.	2.05	11.9	1.34	.37	.75	do	.69	do		
18.	2.00	10.2	1.33	.34	.89	do	.65	do		
19.	1.95	8.8	1.31	.28	.87	do	.60	do		
20.	1.90	7.3	1.30	.25	.84	do	.59	do		
21.	1.85	6.1	1.29	.23	.81	do	.58	do		
22.	1.80	4.9	1.29	.23	.81	do	.55	do		
23.	1.75	4.0	1.27	.20	.81	do	.55	do		
24.	1.65	2.5	1.25	.18	.81	do	.54	do		
25.	1.57	1.64	1.25	.18	.81	do	.50	do		
26.	1.50	1.05	1.25	.18	.79	do	.47	do		
27.	1.50	1.05	1.25	.18	.81	do	.45	do		
28.	1.46	0.85	1.22	.13	.81	do	.38	do		
29.	1.46	0.85	1.20	.10	.81	do	.32	do		
30.	1.46	0.85	1.19	.10	.81	do	.27	do		
31.			1.18	0.09			.22	do		

a Water standing in pools.
b Creek dry for remainder of season.

Monthly Discharge of Moose Jaw Creek near Lang, for 1913.

(Drainage area, —— square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
April (15-30)	15.20	0.85	5.67	0.030	0.018	180
May	0.85	0.09	0.43	0.002	0.002	26
June [a]	0.05	0.00	0.04	0.000	0.000	Nil.
July						Nil.
August						Nil.
September						Nil.
October						Nil.
The period					0.020	206

a No flow after June 4.

MOOSEJAW CREEK AT CHEVRIER'S FARM.

This station was established on April 13. 1910, by P. M. Sauder. It is located at the traffic bridge on the road allowance east of the N. E. ¼ Sec. 15, Tp. 15, Rge. 25, W. 2nd Mer., and is about seventeen and one half miles southeast of Moose Jaw.

After April, 14, 1913, measurements were discontinued at the above station due to the expense of obtaining the same.

DISCHARGE MEASUREMENTS of Moosejaw Creek at Chevrier's Farm, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 14.....	O. H. Hoover.....	63.0	127	0.67	4.67	85

MOOSEJAW CREEK AT MCCARTHY'S FARM.

This station was established on April 7, 1910, by P. M. Sauder and W. H. Greene. It is located at the traffic bridge on the N. W. ¼ Sec. 16 Tp. 16, Rge. 26, W. 2nd Mer., and is three miles south of Moose Jaw P.O.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the inner face of the right abutment of the bridge. The zero of the gauge (elev. 82.99) is referred to a permanent iron bench mark (assumed elev. 100.00), situated 33.5 feet northeast of the gauge.

The stream flows in one channel, which is straight for about 100 feet above and 300 feet below the station. The right bank is high, slightly wooded, and not liable to overflow. The left bank is low, partly wooded and liable to overflow. The bed of the stream is composed of gravel, and is not liable to shift except during high water.

During high water, discharge measurements are made from the downstream side of the bridge, but in low water they are made by wading at a section about 30 feet downstream. The initial point for soundings is at the west end of the handrail of the bridge.

The gauge was read during 1913 by V. J. McCarthy and members of his household.

DISCHARGE MEASUREMENTS of Moosejaw Creek at McCarthy's Farm, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 18.....	O. H. Hoover.....	20	11.0	.....	1.44	Nil.*a*
Feb. 13.....	do	10	5.0	.....	1.30	" *a*
Mar. 28.....	do	.....	.....	.....	2.00	" *a*
April 8.....	do	34	130	2.30	3.90	300.00
May 1.....	do	23	9.7	1.10	0.88	10.70
" 29.....	do	20	5.8	0.73	0.65	4.20
July 7.....	do	27	14.3	1.71	1.04	24.00
" 26.....	do	19	5.2	0.42	0.57	2.20
Aug. 25.....	do	12	2.2	0.29	0.53	0.64
Sept. 26.....	do	.....	.....	.....	0.25	Nil.
Oct. 20.....	do	9.5	1.66	0.25	0.50	0.42
Nov. 14.....	do	10.4	1.79	0.20	0.50	0.36
Dec. 11.....	do	5.7	0.86	.....	0.42	Nil.*a*
" 26.....	F. R. Steinberger.....	1.1	.....	.....	.....	.....*b*

a Stream frozen to bottom.
b Very small discharge.

DAILY GAUGE-HEIGHT AND DISCHARGE of Moosejaw Creek, at McCarthy's Farm, for 1913.

DAY.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.73	Nil.[b]	1.30	Nil.	1.05	Nil.	2.66	Nil.	0.88	13.70	0.57	1.15
2	1.73	"	1.25	"	1.00	"	3.27	.....	0.85	12.30	0.57	1.15
3	1.74	"	1.21	"	1.15	"	3.38	.....	0.83	11.30	0.55	0.93
4	1.70	"	1.20	"	1.14	"	3.36	.....	0.82	10.90	0.55	0.93
5	1.67	"	1.15	"	1.16	"	3.46	.....	0.82	10.90	0.59	1.37
6	1.65	"	1.10	"	1.17	"	3.59	.....	0.78	9.20	0.59	1.37
7	1.65	"	1.12	"	1.22	"	4.15	.....	0.75	8.00	0.55	0.93
8	1.65	"	1.11	"	1.29	"	4.62	*a*	0.75	8.00	0.51	0.49
9	1.62	"	1.10	"	1.35	"	3.75	284.0*b*	0.78	9.20	0.49	0.34
10	1.62	"	1.10	"	1.20	"	3.99	313.0	0.79	9.60	0.48	0.28
11	1.65	"	1.10	"	2.15	"	3.43	246.0	0.77	8.80	0.48	0.28
12	1.60	"	1.20	"	2.10	"	2.91	184.0	0.73	7.20	0.48	0.28
13	1.56	"	1.30	"	1.60	"	2.65	156.0	0.69	5.60	0.48	0.28
14	1.57	"	1.31	"	1.90	"	2.31	121.0	0.68	5.30	0.49	0.33
15	1.45	"	1.30	"	1.65	"	1.95	87.0	0.65	4.20	0.49	0.33
16	1.45	"	1.27	"	1.60	"	1.71	67.0	0.65	4.20	0.50	0.38
17	1.42	"	1.37	"	1.55	"	1.60	58.0	0.62	3.20	0.51	0.49
18	1.30	"	1.30	"	1.40	"	1.53	52.0	0.62	3.20	0.53	0.71
19	1.12	"	1.27	"	1.45	"	1.41	44.0	0.61	2.90	0.54	0.82
20	1.32	"	1.25	"	1.45	"	1.43	45.0	0.61	2.90	0.55	0.93
21	1.39	"	1.25	"	1.44	"	1.48	49.0	0.59	1.40	0.57	1.15
22	1.39	"	1.20	"	1.30	"	1.31	38.0	0.59	1.40	0.58	1.26
23	1.40	"	1.16	"	1.20	"	1.17	29.0	0.55	0.93	0.59	1.37
24	1.37	"	1.00	"	1.25	"	1.08	24.0	0.75	8.00	0.59	1.37
25	1.30	"	1.15	"	1.25	"	1.07	23.0	0.75	8.00	0.60	2.50
26	1.16	"	1.10	"	1.20	"	1.07	23.0	0.78	9.20	0.59	1.37
27	1.41	"	1.00	"	1.30	"	0.99	19.3	0.70	6.00	0.61	2.85
28	1.44	"	1.00	"	2.65	*a*	1.00	19.8	0.67	5.00	0.59	1.37
29	1.44	"	.....	.....	2.46	.....	0.99	19.3	0.65	4.20	0.58	1.26
30	1.39	"	.....	.....	2.35	.....	0.91	15.1	0.59	1.37	0.57	1.15
31	1.35	"	.....	.....	2.79	.....	.....	.....	0.58	1.26	.....	.....

a Between Mar. 28 and Apr. 8—not sufficient data to compute discharge.
b Jan. 1 to Apr. 8—ice conditions.

Daily Gauge-height and Discharge of Moosejaw Creek, at McCarthy's Farm,, for 1913. *Concluded.*

Day.	July.		August.		September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.55	0.93	0.48	0.28	0.52	0.60	0.23	Nil.	0.50	0.38	0.49	0.33
2	0.55	0.93	0.47	0.23	0.52	0.60	0.23	"	0.50	0.38	0.48	0.28
3	0.55	0.93	0.49	0.33	0.51	0.49	0.23	"	0.49	0.33	0.46	0.19
4	0.59	1.37	0.48	0.28	0.51	0.49	0.22	"	0.49	0.33	0.46	0.19
5	0.61	2.85	0.48	0.28	0.51	0.49	0.22	"	0.50	0.38	0.46	0.19
6	0.77	8.8	0.45	0.14	0.49	0.33	0.24	"	0.50	0.38	0.45	0.14
7	1.03	21.0	0.45	0.14	0.48	0.28	0.26	"	0.50	0.38	0.46	0.19
8	1.08	24.0	0.45	0.14	0.47	0.23	0.28	"	0.50	0.38	0.46	0.19
9	1.04	22.0	0.44	0.09	0.45	0.14	0.30	"	0.50	0.38	0.46	0.19
10	1.10	25.0	0.45	0.14	0.43	0.05	0.32	"	0.50	0.38	0.46	0.19
11	1.21	32.0	0.45	0.14	0.41	Nil *c*	0.30	"	0.50	0.38	0.42	0.00
12	1.22	32.0	0.45	0.14	0.41	"	0.30	"	0.52	0.60	0.44	0.09
13	1.13	27.0	0.45	0.14	0.39	"	0.32	"	0.52	0.60	0.46	0.19
14	1.11	26.0	0.49	0.33	0.37	"	0.33	"	0.50	0.38	0.46	0.19
15	1.17	29.0	0.55	0.93	0.36	"	0.37	" *c*	0.49	0.33	0.45	0.14
16	1.17	29.0	0.50	0.38	0.35	"	0.48	0.28	0.50	0.38	0.45	0.14
17	1.12	26.0	0.48	0.28	0.33	"	0.49	0.33	0.50	0.38	0.45	0.14
18	0.99	19.3	0.51	0.49	0.32	"	0.50	0.38	0.50	0.38	0.44	0.09
19	0.91	15.1	0.63	3.6	0.31	"	0.50	0.38	0.50	0.38	0.42	Nil *d*
20	0.79	9.6	0.64	3.9	0.31	"	0.50	0.38	0.49	0.33	0.35	"
21	0.71	6.4	0.59	1.37	0.29	"	0.50	0.38	0.49	0.33	0.30	"
22	0.65	4.2	0.51	0.49	0.29	"	0.50	0.38	0.49	0.33	0.29	"
23	0.63	3.6	0.55	0.93	0.30	"	0.50	0.38	0.49	0.33	0.19	"
24	0.59	1.37	0.55	0.93	0.31	"	0.50	0.38	0.50	0.38	0.19	"
25	0.58	1.26	0.54	0.82	0.29	"	0.50	0.38	0.50	0.38	0.17	"
26	0.58	1.26	0.53	0.71	0.25	"	0.50	0.38	0.50	0.38	0.35	"
27	0.55	0.93	0.51	0.49	0.24	"	0.50	0.38	0.49	0.33	0.32	"
28	0.55	0.71	0.51	0.49	0.24	"	0.50	0.38	0.49	0.33	0.30	"
29	0.52	0.60	0.49	0.33	0.24	"	0.50	0.38	0.49	0.33	0.15	"
30	0.51	0.49	0.47	0.23	0.22	"	0.50	0.38	0.49	0.33	0.05	"
31	0.49	0.33	0.53	0.71			0.50	0.38			0.15	"

c Water standing in pools.
d Stream frozen to bottom.

Monthly Discharge of Moose Jaw Creek at McCarthy's Farm, for 1913.

(Drainage area, 1,719 square miles.)

Month.	Discharge in Second-Feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January						Nil.
February						"
March						"
April	313.00	15.10	87.10	0.051	0.042	3,801
May	13.70	0.93	6.37	.004	.005	392
June	2.85	.28	0.98	.001	.001	58
July	32.00	.33	12.09	.007	.008	793
August	3.90	.09	0.64	.000	.000	39
September	0.60	.00	.12	000	.000	7
October	.38	.00	.20	.000	.000	12
November	.60	.33	.38	.000	.000	22
December	0.33	0.00	0.10	0.000	0.000	6
The year					0.056	5,130

MISCELLANEOUS DISCHARGE MEASUREMENTS made in Moosejaw Creek drainage basin, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per Sec.*	*Sec.-ft.*
April 14....	O. H. Hoover...	Moosejaw Creek...	N.E. 15-15-25-2..	36.0	79.00	0.82	65.
Feb. 12....	do	Thunder Creek....	Moose Jaw.....	6.5	4.08	0.58	2.36

SOURIS RIVER DRAINAGE BASIN.

General Description.

The source of the Souris River is in marshes near Yellow Grass, Saskatchewan. From here it flows in a southeasterly direction almost parallel to the Soo line of the Canadian Pacific Railway to Estevan. It then flows east to Ozbow; then it turns south and crosses the international boundary in Range 34, W. of Principal Meridian. After making a loop into North Dokota, it recrosses the International boundary in range 27, West of the First Meridian and flows in a northeasterly direction to Souris, Manitoba, where it turns east, and finally joins the Assiniboine River, in Township 8, Range 16, West of the First Meridian.

The chief tributaries of Souris River are, Long Creek, which joins it near Estevan, Moose Mountain Creek near Oxbow, North and South Antler Creeks near Sourisford, and Pipestone Creek near Souris.

This stream drains a large tract of typical Western Plains. The rainfall will probably average very little over fifteen inches, and is usually sufficiently divided over the year to prevent excessive run-off or floods. At times when there is an unusual amount of rainfall, and in the early spring the water drains into the streams very rapidly and causes a flood of short duration.

There are towns, villages, and farms, all along the course of the stream and its tributaries, which depend on it for a domestic and industrial water supply. The Canadian Pacific Railway is a large consumer. The town of Estevan is establishing a waterworks system, and there is a proposed system at Weyburn to divert water from Souris River. In North Dokota it has been proposed to divert water for irrigation purposes.

LONG CREEK NEAR ESTEVAN.

This station was established on June 22, 1911, by J. C. Keith. It is located on the S.E. ¼ Sec. 10, Tp. 2, Rge. 8, W. 2nd Mer., and is about half a mile above the mouth of the creek and about two and one half miles south of the town of Estevan.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the shore face of the first row of piles from the north end of the bridge. The zero of the gauge (elev. 83.90) is referred to a permanent iron bench mark (assumed elev. 100.00) on the right bank near the end of the bridge.

The channel is straight for 100 feet above and below the station. Both banks are steep but are liable to be flooded during very high stages of the stream. Both are also covered with brush. The bed of the stream is composed of clean gravel which is not liable to shift. The current is sluggish.

During high water discharge measurements are made from the bridge but during low stages a wading section elsewhere, where the current is swifter, must be used. The initial point for soundings at the bridge is the inner face of the left abutment.

During 1913, the gauge was read by George Pawson.

DISCHARGE MEASUREMENTS of Long Creek near Estevan, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq.-ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
April 12.....	O. H. Hoover	35.0	123	0.84	3.48	103.00
May 10.....	do	15.0	9.3	0.89	1.26	8.30
June 4	do	15.3	12.2	0.675	1.31	8.20
July 30.....	do	13.1	5.83	0.76	1.02	4.40
Sept. 1.....	do	10.7	2.46	0.31	0.66	0.75

Daily Gauge-height and Discharge of Long Creek, near Estevan, for 1913.

Day.	March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			4.65	169.0	1.63	16.0	1.67	17.0
2			4.88	184.0	1.57	14.5	1.58	14.7
3			4.78	178.0	1.53	13.5	1.48	12.3
4			5.30	212.0	1.48	12.3	1.39	10.3
5			4.64	169.0	1.43	11.2	1.32	8.9
6			3.83	126.0	1.37	9.9	1.22	7.2
7			3.79	123.0	1.39	10.3	1.12	5.7
8			3.53	106.0	1.33	9.1	1.03	4.6
9			3.09	79.0	1.29	8.4	0.97	3.8
10			2.53	49.0	1.28	8.3	0.91	3.2
11			2.79	62.0	1.29	8.4	0.89	3.0
12			2.43	44.0	1.33	9.1	0.85	2.6
13			3.73	119.0	1.37	9.9	1.33	9.1
14			3.75	121.0	1.37	9.9	1.27	8.1
15			3.34	94.0	1.48	12.3	1.13	5.9
16			2.89	67.0	1.43	11.2	1.01	4.3
17			2.73	59.0	1.43	11.2	0.98	4.0
18			2.53	49.0	1.41	10.7	0.98	4.0
19			2.43	44.0	1.37	9.9	0.96	3.7
20			2.29	38.0	1.37	9.9	0.94	3.5
21			2.23	36.0	1.35*a*	9.5	0.93	3.4
23			2.11	31.0	1.32	8.9	0.92	3.3
23			2.03	28.0	1.30	8.5	0.92	3.3
24			1.95	25.0	1.29	8.4	1.32	8.9
25			1.88	23.0	1.58	14.7	1.32	8.9
26			1.81	21.0	1.47	12.1	1.19	6.7
27			1.73	19.7	1.33	9.1	1.15	6.2
28			1.68	17.3	1.27	8.1	1.05	4.8
29	2.63	53.	1.67	17.0	1.22	7.2	1.23	7.4
30	2.83	64.	1.71	18.1	1.18	6.6	1.43	11.2
31	2.61	52.			1.69	17.5		

a Gauge height interpolated.

Daily Gauge-height and Discharge of Long Creek, near Estevan, for 1913.—*Concluded.*

Day.	July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.38	10 1	0.88*a*	2 80	0 63	0.52	1.42	4 60
2	1 48	12 3	0 86*a*	2 60	0 66	0 75	1.45	4.60
3	1 43	11 2	0 84*a*	2.40	0 68	0.90	1 48	4.80
4	1 83	21 0	0 82*a*	2.20	0 71	1.15	1.53	5.20
5	2 03	28 0	0 80*a*	2.00	0.73	1.35	1.53	4.80
6	1 95	25 0	0 78*a*	1 85	0 79	1 95	1 53	4 60
7	1 78	18.0	0 76*a*	1 65	0 78	1 85	1 53	4.30
8	1 65	16.5	0 74*a*	1 45	0 78	1 85	1 57	4.40
9	1.56	14 2	0 73*a*	1 35	0 79	1.95	1 57	4.20
10	1 48	12 3	0 72	1 25	0 80	2.00	1 62	4.50
11	1.43	11 2	0 76	1 65	0 83	2 40	1 62	4 20
12	1.58	14 7	0 74	1 45	0 86	2 60	1 63	4.00
13	1 38	10 1	0 73	1 35	0 88	2.80	1 63	3.80
14	1.48	12 3	0 72	1.25	0 88	2.80	1 63	3.50
15	1 42	11 0	0 70	1 05	0 91*b*	3 00	1 63	3.20
16	1 47	12 1	0 68	0 90	0 94*a*	3 00	1 64	3.10
17	1.49	12 6	0 67	0 82	0 97*a*	3 20	1 68	3.30
18	1 44	11 4	0 78	1 85	1 00*a*	3 20	1 66	2.80
19	1 29	8 4	0 93	3 30	1 03	3 30	1 65	2.50
20	1 13	5 9	0 83	2 30	1 03	3 00	1 64	2.10
21	1.07	5 0	0 78	1 85	1 03	2 80	1 65	2.00
22	1 03	4 6	0 73	1 35	1 03	2 50	1 67	2.00
23	1 05	4 8	0 68	0 90	1 08	2 80	1 65	1.55
24	1 06	4 9	0 69	0 97	1 18	3 60	1 64	1.20
25	1 03	4 6	0 69	0 97	1 18	3 40	1 63	0.90
26	1 01	4 3	0 70	1 05	1 23	3 70	1 64*a*	1.00
27	0 98	4 0	0 68	0 90	1 31	4 40	1 65*a*	1.05
28	0 98	4 0	0 66*a*	0 75	1 36	4 70	1 67*a*	1.75
29	1 00	4 2	0 63	0 52	1 37	4 50	1 68	1.35
30	0 99	4 1	0 60	0 30	1 37	4 30	1 70*a*	1.50
31	0 90	3 0	0 63	0 52			1 72	1.70

a Gauge height interpolated.
b After Sept. 15 the elevation of zero flow was raised due to Beaver Dams.

Monthly Discharge of Long Creek near Estevan, for 1913.

(Drainage area, 1,380 square miles.)

Month.	Discharge in Second-Feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
March (29-31)	64.0	52.00	56.30	0.041	0.001	335
April	212.0	17.00	77.60	.056	.062	4,618
May	17.5	6.60	10.50	.008	.009	646
June	17.0	2.60	6.70	.005	.006	396
July	28.0	3.00	10.50	.008	.009	646
August	3.3	0.30	1.47	.001	.001	90
September	4.7	0.52	2.70	.002	.002	158
October	5.2	0.90	3.00	0.002	0.002	186
The period					0.095	7,075

SOURIS RIVER NEAR ESTEVAN.

This station was established on June 23, 1911, by J. C. Keith, it is located about 50 feet below the Canadian Pacific Railway Company's dam on the N.E. ¼ Sec. 11, Tp. 2, Rge 8, W. 2nd Mer., and is about two miles south and three quarters of a mile east of the town of Estevan, and about three quarters of a mile below the mouth of Long Creek.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a heavy timber sunk in and anchored to the left bank. The zero of the gauge (elev. 82.55) is referred to a permanent iron bench mark (assumed elev. 100.00), on the right bank and about 47 feet southeast of the end of the C.P.R. dam.

The channel is straight for about 100 feet above and below the gauge. Both banks are steep but become submerged in very high water. They are also both covered with brush. The bed of the stream is covered with cinders from the Canadian Pacific Railways power house and the section is liable to slight change due to the dumping of cinders on the banks.

Discharge measurements can only be made by wading at the gauge, as the cross-sections at the bridges in that locality are affected by backwater. The flood discharge is estimated by use of suitable weir formulae for the dam above.

During 1913 the gauge was read by Wm. Bevan.

DISCHARGE MEASUREMENTS of Souris River near Estevan, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
Jan. 23*a*	O. H. Hoover	3.0	2.40	0.52	0.80	1.23
Feb. 24	do	2.5	2.50	0.00	1.00	0.00
Mar. 27	do	27.0	37.20	0.51	3.03	19.10
April 12*b*	do	20.0	91.70	1.80	4.04	165.00
May 10	do	15.5	6.80	1.64	1.41	11.10
June 4	do	14.5	10.20	1.79	1.48	18.30
" 28	do	10.5	3.80	1.42	1.07	5.40
July 30	do	13.0	6.50	1.46	1.24	9.50
Sept. 1	do	5.6	0.80	1.88	0.93	1.51
Oct. 2	do	1.6	0.17	0.45	0.87	0.08
" 24	do	11.4	4.15	0.15	0.99	0.64
Nov. 19	do	10.5	4.39	0.19	0.95	0.86
Dec. 6	do	6.3	1.41	0.82	0.91	1.15

a Gauging made below reg. sec., practically no discharge at gauge.
b Gauging made one quarter mile below station, from a bridge.

Daily Gauge-height and Discharge of Souris River, near Estevan, for 1913.

Day.	January.		February.		March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	0.95	2.20	0.80	Nil.	1.40	9.8	5.94	573	1.78	24.0	1 38	13.3
2	0.90	1.00	0.80	"	1.44	10.0	6.30	680	1.70	22 0	1 38	13 3
3	0.90	1.00	0.80	"	1.50	10.4	6.70	804	1 69	22 0	1.37	13 0
4	0.90	1.00	0.80	"	1.50	10 4	8.20	1,344	1.65	21 0	1.48	15.9
5	0.86	0.33	0.80	"	1.55	10.7	9.15	1,705	1.65	21.0	1.48	15.9
6	0.85	0.17	0.83	"	1.57	10 8	8.28	1,374	1.60	19.3	1.30	11 2
7	0.80	Nil.	0.83	"	1.57	10 8	8.05	1,287	1 58	18.7	1.28	10 7
8	0.70	"	0.85	0.17	1.57	10.8	7.30	1,010	1.50	16.5	1.20	8 6
9	0.70	"	0.85	0.17	1.60	11.0	6.50	741	1.50	16.5	1.09	5.8
10	0.70	"	0.85	0.17	1.70	11.6	5.17	374	1.43	14 6	1.00	3 5
11	0 68	"	0.85	0.17	1.75	11 9	4.30	205	1 43	14 6	1.38	13.3
12	0.65	"	0.87	0.50	1.90	12.8	4 32	208	1.43	14.6	1.40	13.8
13	0.60	"	0.90	1.00	2.00	13 4	5 09	356	1.42	14 3	1.40	13 8
14	0.60	"	0.90	1.00	2 40	14 8	4 76	287	1.42	14.3	1 40	13.8
15	0.55	"	0.90	1.00	2.45	15.1	4.50	239	1.42	14.3	1.38	13.3
16	0.55	"	0.90	1.00	2.80	17.2	4.00	162	1.40	13.8	1 38	13.3
17	0.50	"	0.90	1.00	3.00	18 4	4.00	162	1.40	13 8	1.35	12.5
18	0 50	"	0.95	2 20	3.20	19 6	3.90	119	1.39	13 5	1.30	11.2
19	0.80	"	0.95	2 20	3.20	19 6	3.78	135	1 39	13 5	1.30	11.2
20	0.80	"	1 00	3.50	3 20	19 6	3 60	115	1.38	13 3	1.30	11.2
21	0 80	"	1.00	3 50	3.40	21.0	2 50	46	1.38	13 3	1 25	9.9
22	0 80	"	1.00	3 50	3.60	22 0	2 50	46	1.38	13.3	1 20	8.6
23	0.80	"	1.05	4.80	3.50	21.0	2.50	46	1 32	11.7	1.20	8.6
24	0.80	"	1.05	4.80	3.40	21.0	2.47	45	1.32	11.7	1.18	8.1
25	0.80	"	1.20*a*	8.60	3.20	19.6	2.23	38	2.06	33.0	1.17	7.8
26	0 80	"	1.30	9.20	3.05	18.7	2.12	35	2.00	31.0	1.25	9.9
27	0.80	"	1.35	9.50	3 00*a*	18.4	2.10	34	1.83	26.0	1.30	11.2
28	0.80	"	1.40	9.80	3.90	149.0	2.05	31	1.50	16.5	1.37	13.0
29	0 80	"	.....	.....	4.72*b*	280.0	2.00	31	1.46	15.4	2.00	31.0
30	0.80	"	.....	.....	4.86	207.0	1.96	30	1.44	14.9	1.80	25.0
31	0.80	"	.....	.....	4 92	319.0	.....	.....	1.40	13.8	.....	.....

a Feb. 25th to Mar. 27th—ice conditions.
b All computations from gauge heights above 4 ft. are approximate.

DAILY GAUGE-HEIGHT AND DISCHARGE of Souris River, near Estevan, for 1913.—*Concluded.*

DAY.	July		August		September		October		November		December	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	1.90	28.0	1.20	8.6	0.93	1.75	0.84	Nil.	0.94	2.00	0.94	2.00
2	2.00	31.0	1.20	8.6	0.93	1.75	0.86	0 33	0.94	2.00	0.94	2.00
3	2.12	35.0	1.17	7.8	0.93	1.75	0.86	0.33	0.94	2.00	0.94	2.00
4	2.20	37.0	1.16	7.6	0.93	1.75	0.86	0.33	0.94	2.00	0.96	2.50
5	2.26	39.0	1.15	7.3	0.93	1.75	0.86	0.33	0.96	2.50	0.96	2.50
6	2.20	37.0	1.12	6.5	0 93	1 75	0.86	0.33	0.96	2.50	0.96	2.50
7	2.20	37.0	1.10	6.0	0 92	1.50	0.85	0.17	0.96	2.50	0.94	2.00
8	1.18	8.1	1.09	5.8	0.92	1.50	0.85	0.17	0.95	2.30	0.94	2.00
9	2.00	31.0	1.09	5.8	0.91	1.25	0.84	0.00	0.95	2.30	0.94	2.00
10	2.00	31.0	1.05	4.8	0 91	1.25	0 84	0.00	0.94	2.00	0.92	1.50
11	1.96	30 0	1.00	3.5	0 91	1.25	0.90	1.00	0 94	2.00	0 90	1.00
12	1.94	29.0	1.00	3.5	0 85	0 17	0.90	1.00	0.94	2.00	0.90	1.00
13	1.80	25.0	1 00	3.5	0.83	Nil.	0 90	1.00	0.96	2.50	0.89	0.83
14	1.80	25.0	1.00	3.5	0.83	"	0.88	0.67	0.96	2.50	0.89	0.83
15	1.68	22.0	1.00	3.5	0.83	"	0.88	0.67	0.96	2.50	0.89	0.83
16	1.68	22.0	1.00	3.5	0.84	"	0.88	0.67	0.96	2.50	0.88	0.67
17	1.52	17.1	1 00	3.5	0.84	"	0.86	0.33	0.96	2.50	0.86	0.33
18	1.48	16.0	1.00	3.5	0.84	"	0.86	0.33	0.96	2.50	0.86	0.33
19	1.44	14.9	1 00	3.5	0.84	"	0.86	0.33	0.96	2.50	0.86	0.33
20	1.44	14.9	0.98	3.0	0.84	"	0.86	0.33	0.94	2.00	0.86	0.33
21	1.44	14.9	0.98	3.0	0.85	0.17	0.90	1.00	0.94	2.00	0.86	0.33
22	1.40	13.8	0 97	2.8	0.85	0.17	0 90	1.00	0.94	2.00	0 86	0.33
23	1.38	13.3	0 97	2.8	0.85	0.17	0 90	1.00	0.94	2.00	0.86	0.33
24	1.36	12.8	0 97	2.8	0.85	0.17	0.99	3.30	0.94	2.00	0.86	0.33
25	1.35	12.5	0.96	2.5	0 89	0.83	0.99	3.30	0.94	2.00	0.86	0.33
26	1.34	12.2	0 96	2.5	0.86	0.33	0.96	2.50	0 94	2.00	0.86	0.33
27	1.30	11.2	0.95	2.3	0.86	0.33	0.96	2.50	0.95	2.30	0.86	0.33
28	1.30	11.2	0 95	2.3	0.85	0.17	0.96	2.50	0.95	2.30	0.84	Nil.
29	1.28	10.7	0.95	2.3	0.84	Nil.	0.96	2.50	0.95	2.30	0.80	"
30	1.28	10.7	0.95	2.3	0.84	"	0.95	2.30	0.95	2.30	0.74	"
31	1.26	10.2	0.95	2.3	.....	.....	0.95	2.30	.....	.....	0.70	"

MONTHLY DISCHARGE of Souris River near Estevan, for 1913.

(Drainage area, 4,550 square miles.)

MONTH.	DISCHARGE IN SECOND-FEET.				RUN-OFF.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
January	2.20	0.00	0.287	0.0001	0.0001	18
February	9.80	0.00	2 420	.0005	.0005	134
March	319.0	9.80	44.000	.0100	.0120	2,705
April	1705.00	30.00	409.700	.0900	.1010	24,379
May	33.00	11.70	17.300	.0040	.0050	1,064
June	31.00	3.50	12.400	.0030	.0030	738
July	39.00	8.10	21.400	.0050	.0060	1,316
August	8.60	2.30	4.230	.0010	.0010	260
September	1.75	0.00	0.659	.0001	.0001	39
October	3.30	0.00	1.050	.0002	.0002	65
November	2.50	2.00	2.230	.0005	.0006	133
December	2.50	0.33	0.961	0.0002	0.0002	59
The year	.....	.....	.....	.....	0.1327	30,910

MOOSE MOUNTAIN CREEK NEAR OXBOW.

This station was established on September 4, 1913, by O. H. Hoover. It is located near W.E. Chrismas' house on N. E. ¼ Sec. 15, Tp. 3, Rge. 2, W. of the 2nd Mer., and is about one mile south and half a mile west from Oxbow.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream on the left bank. The zero of the gauge (elev. 91.94) is referred temporarily to the top of a stump of a small tree (assumed elev. 100.00) on the left bank approximately fifteen feet from the gauge.

The channel is straight for a considerable distance above the gauge but takes a sharp curve to the right about one hundred yards below the gauge. Both banks are steep and not likely to overflow during flood stages. Both are partly covered with wood. The bed of the stream consists of clean sand and gravel and may shift slightly during flood stages. The records could be affected by future beaver dams as they are now numerous in the vicinity.

Discharge measurements are made at the traffic bridge about one half mile upstream during high stages, and during low water periods are made by wading at a section very close to the gauge.

During 1913, the gauge was read by W. E. Chrismas.

Discharge Measurements of Moose Mountain Creek near Oxbow, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
July '31	O. H. Hoover	18.1	17.3	0.58	.....	10.0
Sept. 4	do	12.3	4.4	0.88	1.16	3.9
Oct. 4	do	9.3	2.2	0.93	0.93	2.0
" 28	do	10.0	2.9	1.08	1.01	3.2

Daily Gauge-height and Discharge of Moose Mountain Creek, near Oxbow, for 1913.

Day.	September.		October.		November.		December.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	.....	.....	0.99	2 7	1.35	5 8	1.13	3.7
2	.....	.....	0.98	2.6	1.28	5.0	1.12	3.6
3	.....	.....	0.96	2.5	1.02	2 9	1.11	3.5
4	1.16	4.0	0.93	2 4	1.32	5 4	1.12	3.6
5	1.24	4.7	0.94	2.4	1.23	4.6	1 09	3.4
6	1.27	5.0	0.97	2 6	1.19	4.2	1.03	3.0
7	1.23	4.6	1.04	3.0	1.27	5 0	1 10	3.4
8	1.21	4 4	1.04	3 0	1.22	4.5	0 99	2.7
9	1.18	4.1	1.02	2 9	1 24	4 7	1 03	3.0
10	1.14	3.8	1.10	3 4	1 66	9 3	0 97	2.6
11	1 11	3.5	1 35	5 8	1.29	5 2	0 98	2.6
12	1 10	3 4	1 35	5 8	1.27	5 0	0 92	2.3
13	1 08	3 3	1.31	5 4	1.49	7 2	0.94	2.4
14	1 06	3 2	1.27	5 0	1 51	7 5	0 92	2.3
15	1 06	3.2	1.26	4 9	1.29	5 2	0.91	2.3
16	0 98	2.6	1 23	4 6	1 27	5 0	0.90	2.2
17	0 93	2 4	1 32	5 4	1 32	5 4	0 87	2.1
18	0 90	2 2	1 32	5 4	1 31	5 4	0 85	2.0
19	0 89	2 2	1 37	6 0	1 13	3 7	0 87	2.1
20	0 86	2 0	1 32	5 4	1 18	4 1	0 87	2.1
21	0 77	1.6	1 34	5 6	1 20	4 3	0 78	1.6
22	0 76	1 6	1.36	5 8	1 39	6 2	0.83	1.9
23	0 88	2 1	1 34	5 6	1 27	5 0	0 77	1.6
24	0 98	2 6	1 27	5 0	1 29	5 2	0 74	1.5
25	1 02	2 9	1 32	5 4	1 18	4 1	0.75	1.5
26	1 01	2 8	1 41	6 4	1 18	4 1	0 75	1.5
27	0 98	2 6	1 41	6 4	1 17	4 0	0 74	1.5
28	0 95	2 5	1 01	2 8	1 20	4 3	0 74	1.5
29	0 97	2 6	1 38	6 0	1 12	3 6	0 72	1.4
30	1 00	2 8	1 30	5 2	1 17	4 0	0 71	1.4
31	...	...	1 36	5 8	...	...	0 72	1.4

Monthly Discharge of Moose Mountain Creek near Oxbow, for 1913.

(Drainage area, 2,953 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
September (4-30)	5.0	1.6	3.06	0.001	0.001	164
October	6.4	2.4	4.55	.002	.002	280
November	7.5	2.9	4.99	.002	.002	297
December	3.7	1.4	2.31	0.001	0.001	142
The year					0.006	883

SOURIS RIVER NEAR GLEN EWEN.

This station was established on June 26, 1911, by J. C. Keith. It is located near D. F. Preston's house on the N.E. ¼ Sec. 36, Tp. 2. Rge 1, W. 2nd Mer., and is about three miles south and half a mile east from Glen Ewen.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to a post sunk in the bed of the stream at the left bank. The zero (elev. 79.32) is referred to a permanent iron bench mark (assumed elev. 100.00) on the left bank and within a few feet of the gauge.

The channel is slightly curved for some distance above and below the gauge. Both banks are steep but will overflow in very high stages of the stream. Both are partly covered with woods. The bed of the stream is composed of clean sand and gravel and may shift during high water. Beavers sometimes affect the records at the gauge by building dams and causing backwater.

Discharge measurements are made at the traffic bridge on the road allowance east of Sec. 2, Tp. 3, Rge. 1, W. 2nd Mer., during high stages; during low water periods measurements are made by wading at a point about 400 yards below the gauge.

During 1913 the gauge was read by D. F. Preston.

Discharge Measurements of Souris River near Glen Ewen, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec. ft.*
May 9	O. H. Hoover	52.0	101.0	0.89	2.76	90.0
June 7	do	46.3	87.2	0.77	2.37	67.0
July 2	do	46.0	65.9	0.44	2.02	29.0
Aug. 1	do	43.7	56.6	0.34	1.85	19.4
Sept 5	do	23.9	15.4	0.41	1.59	6.4
Oct. 3	do	24.2	16.5	0.20	1.65	3.4
" 29	do	37.0	30.4	0.45	2.01	13.8

Daily Gauge-height and Discharge of Souris River, near Glen Ewen, for 1913.

Day.	March.		April.		May.		June.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-f*	*Feet.*	*Sec.-ft.*
1			10.12		3.22	154	2.45	61
2			10.75		3.21	153	2.42	62
3			10.30		3.06	131	2.40	60
4			10.00		2.97	123	2.39	59
5			9.80		2.93	119	2.37	57
6			8.35		2.90	115	2.35	55
7			8.00		2.87	111	2.37	57
8			8.30		2.77	99	2.36	56
9			8.60		2.75	97	2.35	55
10			8.25		2.72	93	2.27	48
11			8.03		2.70	91	2.25	46
12			7.66		2.70	91	2.19	41
13			7.55		2.69	90	2.18	40
14			7.46		2.72	93	2.24	45
15			6.95*b*		2.70	91	2.27	48
16			6.65	599*c*	2.67	88	2.19	41
17		5 00*a*	6.40	567	2.66	87	2.17	40
18			6 01	516	2.64	84	1.98	27
19			5.70	476	2.63	83	1.98	27
20			5 50	450	2.65	86	1.97	26
21			5 65	470*c*	2.67	88	2.00	28
22			4 95	378	2.63	83	2.01	29
23		3 55	4.30	294	2.59	79	2.00	28
24		3 55	4.12	271	2.55	75	1.98	27
25		3 55	3.97	251	2.60	80	2.00	28
26		3 55	3 80	229	2.56	76	2.00	28
27		3 47	3.78	226	2.53	73	1.98	27
28		3.55	3.60	203	2.50	70	1.98	27
29		4 86	3.42	180	2.48	68	2.00	28
30		6 62*a*	3.32	167	2.64	84	2.12	36
31		8 90*b*			2.48	68		

a Ice conditions Mar. 17–30.
b Not sufficient data to compute discharge Mar. 31 to Apr. 15.
c Discharge approximate Apr. 16–21.

Daily Gauge-height and Discharge of Souris River, near Glen Ewen, for 1913. *Concluded.*

Day.	July.		August.		September.		October.	
	Guage Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1	2.01	29	1.86	20.0	1.63	8.0	1.66	9.5
2	2.02	29	1.85	19.2	1.60	6.5	1.65	9.0
3	2.02	29	1.84	18.7	1.60	6.5	1.65	9.0
4	2.02	29	1.82	17.6	1.60	6.5	1.64	8.5
5	2.33	53	1.80	16.5	1.60	6.5	1.64	8.5
6	2.45	64	1.79	16.0	1.61	7.0	1.67	10.0
7	2.50	70	1.79	16.0	1.67	10.0	1.74	13.5
8	2.40	60	1.76	14.5	1.66	9.5	1.74	13.5
9	2.36	56	1.78	15.5	1.65	9.0	1.75	14.0
10	2.45	64	1.73	13.0	1.65	9.0	1.77	15.0
11	2.48	68	1.74	13.5	1.64	8.5	1.78	15.5
12	2.47	66	1.76	14.5	1.61	7.0	1.80	16.5
13	2.47	66	1.77	15.0	1.60	6.5	1.80	16.5
14	2.48	68	1.76	14.5	1.59	6.0	1.85	19.2
15	2.42	62	1.75	14.0	1.58	5.6	1.85	19.2
16	2.38	58	1.73	13.0	1.57	5.2	1.85	19.2
17	2.34	54	1.70	11.5	1.65	9.0	1.85	19.2
18	2.34	54	1.82	17.6	1.90	22.0	1.85	19.2
19	2.30	50	1.85	19.2	1.87	20.0	1.85	19.2
20	2.22	44	2.12	36.0	1.84	18.7	1.86	20.0
21	2.18	40	1.97	26.0	1.70	11.5	1.90	22.0
22	2.18	40	1.95	25.0	1.66	9.5	1.97	26.0
23	2.18	40	1.92	23.0	1.65	9.0	1.95	25.0
24	2.17	40	1.90	22.0	1.65	9.0	1.95	25.0
25	2.14	38	1.86	20.0	1.64	8.5	1.97	26.0
26	2.10	34	1.82	17.6	1.64	8.5	1.95	25.0
27	2.03	30	1.78	15.5	1.65	9.0	1.94	24.0
28	1.96	26	1.75	14.0	1.65	9.0	1.93	24.0
29	1.95	25	1.70	11.5	1.69	11.0	2.01	29.0
30	1.92	23	1.68	10.5	1.65	9.0	1.97	26.0
31	1.90	22	1.64	8.5	.....	.....	1.95	25.0

Monthly Discharge of Souris River near Glen Ewen, for 1913.

(Drainage area, 7,500 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Dept in inches on Drainage Area.	Total in Acre-feet.
April (16-30)	599	167.0	345.00	0.045	0.025	10,268
May	154	68.0	94.40	0.012	0.014	5,804
June	64	26.0	41.30	0.006	0.007	2,458
July	70	22.0	46.10	0.006	0.007	2,835
August	36	8.5	17.00	0.002	0.002	1,045
September	22	5.2	9.36	0.001	0.001	557
October	29	8.5	18.40	0.002	0.002	1,131
The period					0.058	24,098

SOURIS RIVER NEAR MELITA.

This station was established on July 20, 1911, by J. C. Keith. It is located at the traffic bridge on the S. W. ¼ Sec. 6, Tp. 4, Rge. 26, W. 1st Mer.

The gauge, which is a plain staff graduated to feet and hundredths, is nailed to the west pile on the down stream side of the bridge. The zero of the gauge (elev. 84.45) is referred to a permanent iron bench mark (assumed elev. 100.00), on the right bank 51 feet from the end of the bridge.

The channel is straight for a distance above the station, but curves to the right a short distance below. The banks are high and partly wooded. The bed of the stream is composed of clean sand and gravel, which may shift during high water.

Discharge measurements are made from the bridge, except during extreme low water when they are made by wading.

During 1913, the gauge was read by E. Sykes.

DISCHARGE MEASUREMENTS of Souris River near Melita, in 1913.

Date.	Hydrographer.	Width.	Area of Section.	Mean Velocity.	Gauge Height.	Discharge.
		Feet.	*Sq. ft.*	*Ft. per sec.*	*Feet.*	*Sec.-ft.*
May 8	O. H. Hoover	116	868	1.44	8.70	1,249
June 5	do	86	256	0.82	2.70	210
" 30	do	76	142	0.25	1 35	36
Sept. 6	do	53	85	0.52	1.39	45
Aug. 2	do	49	81	0.44	1.24	36
Oct. 6	do	49	81	0.33	1.21	27
" 27	do	36	18	1.19	1.03	21

DAILY GAUGE-HEIGHT AND DISCHARGE of Souris River, near Melita, for 1913.

DAY.	May.		June.		July.		August.		September.		October.	
	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.	Gauge Height.	Discharge.
	Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1			3.05	264	1.71*a*	71	1.23	31	1.35	39	1.19	29
2			3.01	258	1.89*a*	93	1.23	31	1.35	39	1.19	29
3			2.99	255	2.07*a*	117	1.23	31	1.35	39	1.17	28
4			2.97	252	2.26	144	1.23	31	1.34	38	1.16	28
5			2.85	233	2 22	138	1.20	30	1 33	38	1.15	27
6			2.72	213	2 20	135	1.17	28	1.32	37	1 15	27
7			2.45	172	2.17	131	1.15	27	1.31	36	1 13	26
8			2.45*a*	172	2.14	127	1.14	26	1.30	36	1.13	26
9			2.46	174	2 09	120	1 13	26	1.29	35	1 12	26
10			2.44	171	2.05	114	1.18*a*	28	1.28	34	1 12	26
11			2.38*a*	162	2 01	108	1.24	32	1 27	34	1.11	25
12	8.85	1,278	2.32*a*	153	1.99	106	1.21	32	1.27	34	1 11	25
13	7.40	1,021	2.26*a*	144	1.96	102	1.24	32	1.27	34	1 11	25
14	7.10	968	2.19	134	1.91	95	1 23	31	1 26	33	1 10	24
15	7.00	950	2.14*a*	127	1.87	90	1 22	31	1.25	32	1 10	24
16	6.93	938	2.09*a*	120	1.84	87	1 29*a*	35	1 25	32	1 08	24
17	6.35	836	2.04*a*	113	1 81	83	1 36*a*	40	1 25	32	1 08	24
18	6.05	782	1.99*a*	106	1 79	81	1.43*a*	45	1.24	32	1 08	24
19	5.25	641	1.94*a*	99	1.72*a*	72	1 50	50	1.24	32	1 07	23
20	5.00	596	1.88*a*	92	1 65	65	1 65	65	1.23	31	1 06	23
21	4.85	570	1.83*a*	86	1.61	64	1.46	47	1.22	31	1.06	23
22	4.20	456	1.78*a*	80	1.63	63	1.43*a*	45	1.22	31	1 05	22
23	4.02	424	1.73*a*	74	1.60	60	1 41	43	1.21	30	1.05	22
24	3.89	401	1.68*a*	68	1 58	58	1 40	42	1 26	33	1 05	22
25	3.63	365	1.62*a*	62	1.52	52	1 40*a*	42	1 27	34	1 04	22
26	3 43	325	1.57*a*	57	1 58	58	1 40*a*	42	1 27	34	1 04	22
27	3.22	291	1.52*a*	52	1 45	46	1 40	42	1 26	33	1 03	21
28	3.15	280	1.47*a*	48	1 35	39	1 38	41	1.25	32	1 03	21
29	3.12	275	1.41*a*	43	1 26	33	1 35	39	1.24	32	1 03	21
30	3.09	270	1.35	39	1 25	32	1 35	39	1.22	31	1 02	21
31	3.07*a*	267			1 24	32	1 35	39			1 02	21

a Gauge height interpolated.

Monthly Discharge of Souris River near Melita, for 1913.

(Drainage area, 10,673 square miles.)

Month.	Discharge in Second-Feet.				Run-Off.	
	Maximum.	Minimum.	Mean.	Per square Mile.	Depth in inches on Drainage Area.	Total in Acre-feet.
May (12-31)	1,278	267	597.0	0.056	0.042	23,673
June	264	39	134.0	.012	.013	7,974
July	144	32	84.4	.008	.009	5,190
August	65	26	36.8	.003	.003	2,263
September	39	30	33.9	.003	.003	2,017
October	29	21	24.2	0.002	0.002	1,488
The period					0.072	42,605

Miscellaneous Discharge Measurements made in Souris River drainage basin, in 1913.

Date.	Hydrographer.	Stream.	Location.	Width.	Area of Section.	Mean Velocity.	Discharge.
				Feet.	*Sq. feet.*	*Feet per Sec.*	*Sec.-ft.*
Feb. 21	O. H. Hoover	Morrison Creek	N.W. 7-8-2-2		Creek Dry		
April 4	do	Souris River	S.W. 15-2-8-2	20.0	91.7	1.80	165

SESSIONAL PAPER No. 25c

APPENDIX

REPORT ON ATHABASCA DISTRICT BY GORDON J. SMITH B.A.,

DISTRICT HYDROGRAPHER.

Previous to the summer of 1913, what was known as the "Edmonton district", included the district from Red Deer to Edmonton and thence eastward to Fort Saskatchewan, northward to St. Albert and occasionally to Athabasca Landing and westward over the line of the Grand Trunk Pacific as far as the "Summit"; covering the streams flowing from the eastern slope of the mountains. With the exception of a few winter measurements taken early in 1913, practically no work has been done west of Edmonton.

During the month of May however, preparations were made for more extensive work along the line of the Grand Trunk Pacific Railway west of Edmonton, and during June a cable station was erected across the Athabasca River at Jasper, a point 235 miles west of Edmonton, thus enabling discharge measurements to be made on the Athabasca at all stages of flow.

It was found that with the cable station at Jasper, and so many other streams, the area was too extensive to be covered by one hydrographer, and so the part westward from Edmonton to Jasper was placed under a separate head, to be known as the "Athabasca Hydrographic District". This was to extend from the divide between the North Saskatchewan and Athabasca drainage basins (about five or six miles east of Entwistle), westward to Jasper. I was placed in charge of this new district, while Mr. Thompson took over the Edmonton area.

The Athabasca River forms the main drainage channel in the district to the west and north of Edmonton. But there are also two minor basins, those of the MacLeod and Pembina Rivers. While these two eventually reach the Athabasca, I wish to consider them to some extent separately from the Athabasca.

The channel of the Athabasca drains the area farthest west in the district, the MacLeod the central part, and the Pembina the most easterly area.

Athabasca River.—The Athabasca River rises in the Rocky Mountains at about 52° 20′ N. Latitude and 117° 30′ W. Longtitude, and flows in a north and easterly direction to its mouth in Lake Athabasca.

In the early part of its course, the Athabasca has the characteristics of a large mountain stream with its canyons, waterfalls and rapids. The character of the country is such, the rocks being almost all sedimentary, of the limestone and quarzite varieties, that all the mountain streams even the Athabasca in its upper stretches, have developed canyons at some points in their courses.

I was able to make a reconnaissance of the Athabasca to a point about thirty miles from Jasper towards its source. I reached the "Falls of the Athabasca" at this time and have already reported on them.

I did not follow the river farther eastward however, than where it leaves the line of the Grand Trunk Pacific Railway, near Hinton. In this direction there are some fairly large tributaries, including the Hay and Baptiste Rivers, which I was unable to reach.

Below the falls, the Athabasca widens out and flows with a very even gradient, there being very few sudden falls of any extent. The valley also widens out, as the river grows larger, and varies from two to three miles or more in width. From Jasper eastward, the valley of the Athabasca is known as the "Yellowhead Pass" and its course is followed by the Grand Trunk Pacific Railway. Perhaps the most noticeable characteristic here is the very low altitude of the river, which is around 3000 feet. This accounts to a large extent for the small drop of the river throughout its course.

After leaving the mountains the Athabasca flows for some distance through a wooded section, and here it does not exhibit the meandering tendencies of the MacLeod and Pembina Rivers farther east, but rather tends towards a straight even course.

During the month of June a cable station was erected across the river of Jasper. A gauge rod and permanent iron bench mark were put in, and discharge measurements were made during the remainder of the season. Previous to this, measurements had been taken by wading the river, when possible, a short distance upstream.

The main channel of the river at this point is about 360 feet wide, and there is a small channel on the east side about 40 feet in width, which can be waded at all times, and which dries up in the late summer. When the station was built in June, the river was in flood and

what appeared to be the best section then was chosen; as the river dropped however, a gravel bar appeared in the centre of the main channel which caused some cross-currents.

Discharge measurements were made at Jasper on an average of once in from two to three weeks during the summer, and the discharge varied from 12,000 to 4,500 second-feet from July to October.

One feature of the Athabasca to be noted is that rain plays, directly, only a very small part in the variation of the discharge of the river at the Jasper station. A rainfall of two or three days will, contrary to the behaviour of the McLeod and some of the other rivers, make scarcely a noticeable difference in the gauge-heights of the Athabasca. A day or two of hot clear weather will on the other hand cause a rise of from one to three feet, and a cold or freezing night, a corresponding depression.

The small direct effect of rainfall and the large one of hot weather is probably due, to some extent, to the large size of the Athabasca, and more particularly to the fact that the lower valleys of the mountains are the only places where precipitation is received directly as rain, it coming as snow farther up the slopes and accumulating as snow-fields, which serve as reservoirs to swell the river in the hot weather.

Whirlpool River.—The Whirlpool River enters the Athabasca from the southwest at a point, about twelve miles south of Jasper. I was unable to visit this river and am not able to report on it.

Miette River.—The Miette River joins the Athabasca about a mile southwest of Jasper. It flows eastward from the "Divide" to its mouth, a distance of some eighteen miles. Above the mouth the river follows a twisted course for some distance and has a comparatively low gradient. At Jasper the Grand Trunk Pacific Railway leaves the valley of the Athabasca, turns to the westward and follows the narrower valley of the Miette to the summit of the Yellowhead Pass.

During the early part of 1913 a few winter measurements were taken on the Miette River, and for a short time after the ice went out, the river could be waded. But continued hot weather brought down the snow, and the river rose about six feet, so that wading was out of the question. There is a traffic bridge across the river about two miles south of Jasper, and from this a discharge measurement was made, with considerable difficulty, when the river was practically at its highest and the water running over the bridge.

Several measurements of the discharge were made here during the summer. The bed of the stream at this point is mostly soft mud and was continually shifting. Later in the season the section became blocked with debris. Due to this, and the fact that it was the intention of the Park Superintendent to erect a more permanent structure at this point, I established the regular station for the Miette at the second traffic bridge, a short distance farther upstream. This bridge is a wooden structure built on heavy broken stone piers and is supposed to be permanent. The section here is also much better, being composed of hard gravel and small stones. The river is comparatively straight for a short distance on each side of the bridge, so that thecurrent at the station is perpendicular to the section. Measurements were taken at this station after the beginning of September.

The discharge of the Miette from June to October varied from about 1,600 to 400 second-feet.

Maligne River.—The Maligne River rises in Maligne Lake and follows a northwesterly course to the Athabasca River, joining it about six miles northeast of Jasper. Its basin lies about parallel to that of the Upper Athabasca, and is separated from the latter by the Maligne range of mountains.

I visited the Maligne River during the early part of July, and found that fording at this time of year was impossible. For a distance of some two miles above its mouth, the river is about fifty feet wide, from three to four feet in depth, and runs very swiftly, making a crossing in this stretch impracticable. In these two miles the river has a bed of sand and gravel. Its banks are fairly low and even. Above this however the channel lies in a deep, narrow canyon, which grows continually deeper and narrower for some distance upstream.

At the lower end of the canyon the Maligne seems to have its full volume flowing at the surface, but at a point about half a mile above the lower end, two-thirds of the flow disappears underground, leaving in the spring and summer a small third, and in the later fall a mere trickle flowing down through the canyon above this point.

Above the entrance of the underground portion the remaining water flows down through the very narrow, deep canyon in a series of cataracts, falling about 300 feet in a distance of half to three-quarters of a mile. The character of the surroundings is such, that the question of power would be reasonable, were it not for the comparatively small surface-flow of water, which in the late autumn would almost disappear.

I was unable to cross the river where it had its full volume, and therefore was unable to make any measurements of its discharge. Above the canyon where the river was comparatively small, I made some measurements during September and October, and the discharge was slightly over one hundred second-feet. This is only a small percentage of the flow below the canyon, where the river is all above ground.

I made a triangulation survey of the Maligne, and preparations were made for erecting a cable station at a point about one hundred yards above the mouth of the river. The section at this point is very good and should prove satisfactory for obtaining discharge measurements at all stages.

Snaring River.—The Snaring River flows into the Athabasca from the northwest, at a point about twelve miles northeast of Jasper.

I made several visits to the Snaring by trail from Jasper during the season, but until the middle of September, when I was able to wade the river, I could not get a satisfactory measurement of its discharge.

The Grand Trunk Pacific Railway has a steel bridge across the river a short distance from its mouth, but the section at this point is very poor, so that I did not attempt a measurement.

The Canadian Northern Railway had bridge in course of construction about a quarter of a mile further upstream, and while at the time, the section there was also very poor, changes may be made during the erection of the bridge, that may enable measurements to be taken there. Otherwise it will be necessary to construct a cable station, as the river can rarely be waded before the second or third week in September at any point, where a satisfactory discharge measurement could be made.

Rocky River.—The course of the Rocky River lies to the northeast and parallel to those of the Maligne and the Upper Athabasca Rivers. From the former it is separated by the Colin range, and its eastern limit is the Miette range. The river comes down from the southeast and joins the Athabasca near a station on the Grand Trunk Pacific Railway called Hawes.

Some winter measurements were made of the Rocky River during the early part of 1913, and when the ice went out, measurements were made from the stell bridge of the Grand Trunk Pacific Railway.

Early in June, I put in a staff gauge and established a regular station at the bridge the description of which I sent to Calgary. The gauge was read during the summer by the pump man at the Hawes water tank.

The river is very swift at this point during its high stages, but with care accurate gaugings may be made. Later in the summer the river drops considerably, and may be waded beneath the bridge. Between this point and its mouth, a distance of some three hundred yards, the river drops about five or six feet and empties into the Athabasca through several small channels. At high stages the force of the discharge has been such that the Athabasca has been forced over and has torn down its opposite bank for some distance back.

Above the railway the river flows in several channels over a wide flat, which gradually narrows, till at a point about five miles upstream, it becomes a canyon, which extends for some miles. The canyon is very narrow and at places has shear limestone walls rising from the water to a height of about three hundred feet on both sides. At these points the width of water at the bottom is scarcely twenty-five feet, so that the flow is very turbulent and swift.

From the data collected over a period of five or six months, from May until October, it will be seen that the discharge was exceedingly irregular, at times the higher gauge height having the smaller discharge and vice versa. I tried by careful study of the data, and of the stream itself, to find some explanation for this, and the only reason I could find was the shifting nature of the stream bed. The bed is composed of small gravel and coarse sand, shifts a great deal under even small floods, so that this might alter the relation of the discharge to the gauge height.

Stoney River.—The Stoney river flows down from the Northwest and joins the Athabasca about three miles downstream from the mouth of the Rocky. The valley of the Stoney forms the pack route into the mountains to the northward.

Some winter measurements were made in the Stoney in the early part of 1913, but after the first part of May there was no way to cross the Athabasca, so that I was unable to visit the river.

Railway workmen, who had been on the northwest side of the Athabasca, stated that the Stoney was quite large, and could not be waded till late in the autumn.

Fiddle Creek.—Fiddle Creek joins the Athabasca from the Southeast about four miles east of the Grand Trunk Pacific Railway station of Pocahontas. The railway crosses the river about one hundred yards above its mouth.

Above its mouth the river flows in several small channels over a flat, but a short distance up the valley narrows and soon developes into a canyon. The character of the country is such that the river is subject to violent floods, which on one occasion carried out the bridge piers.

I obtained discharge measurements by wading the river, a short distance above the Grand Trunk Pacific Railway bridge during August and September, and its discharge at this time varied from 300 down to 70 second-feet.

Toward the end of this time the river was dropping rapidly. It is improbable that the stream could be waded much before the middle of July.

Prairie Creek.—Prairie Creek lies to the east of the first range of the Rockies. It runs northward in the foothills, and joins the Athabasca in Sec. 5, Tp. 51, Rge. 25, W. 5th Mer., about four miles west of Hinton.

The stream varies up to twenty-five feet in width and is quieter and more regular in its flow than the mountain streams. I made measurements of the stream by wading, and from July to October the discharge ran from 70 to 10 second-feet. It would probably be much greater earlier in the season, and become negligible during October.

McLeod River.—A short distance east of Hinton, the Grand Trunk Pacific Railway leaves the valley of the Athabasca, crosses a divide near Obed, turns to the eastward, and strikes into the drainage area of the McLeod River. From Obed the Athabasca continues in a northeasterly direction, through a rolling country interspersed with muskeg.

The McLeod River rises in the Rockies just south of the 53rd Parallel and in ranges 23 and 24, west of the 5th meridian.

I was unble to spend much time in the upper regions of the McLeod, but early in September, together with Mr. G. H. Whyte, I made a trip in from Bickerdike to "Mile 37" on the Alberta Coal branch. From there, through the kindness of the Forest Supervisor, I was able to go up over the Mountain Park line on his gasoline speeder, and get a look at the country through which the McLeod River flows in its early stages.

In these upper stretches the McLeod is typically mountainous in character, and drops very rapidly. It differs from the Athabasca, not only greatly in size, but it also has a much narrower and more confined valley.

After leaving the mountains the McLeod flows through a series of rolling, well watered forest, and as it leaves the mountains farther behind, its gradient becomes very regular, and its bed wide and comparatively shallow. Its most noticeable characteristic is its meanders. The country through which it flows is fairly soft, consisting mostly of clay and soft sandstone and this probably helps to account for its exceedingly twisted course.

Discharge measurements had been made on the McLeod during the spring of 1913, from the railway bridge at "Mile 6" on the Alberta Coal Branch, in Sec. 5, Tp. 52, Rge. 18, W. 5th. Mer. This point however is objectionable in almost every particular, so that, while I was forced to take measurements here, it being the only available spot, I did not establish a regular station. The discharge at this point from May to October varied between about 1,850 to 350 second-feet.

The section under the railway bridge is very poor, there being two channels, both of which are running at high water, and one of which is full of still water, when the river is lower. The bottom is very uneven with large rocks and ledges. The river turns a short distance above the bridge, so that in no way is the section particularly good.

In addition to this the measurements had to be taken from the bottom girders of the steel bridge, which are about forty feet above the river. This was an awkward proposition.

Finally there is the train service. The train leaves Edson three days a week at 2 a.m. There is no scheduled time for its return, and it is liable to come back anywhere between three the same afternoon and noon the following day. As there is no accommodation at all at "Mile 6", this is very troublesome. On one occasion the train failed to stop at twelve at night, necessitating a six mile walk to Bickerdike, and the sending of a section crew for the instruments and sounding weights.

There were towers and a cable across the McLeod a short distance above the bridge, which had beem used by the contractors when building the railway. These could have been repaired and used perhaps, but the section here was worse, if anything, than that at the bridge.

I examined the McLeod River, near the mouth of Wolf Creek, about ten miles east of Edson, on my visit to the latter stream, and at the end of September I was able to wade the McLeod at this point and make a discharge measurement. The section here is admirable, the river being about three hundred feet wide, of almost uniform depth, and having a bed of small gravel. Wading however is not possible much before the middle of September.

At this point the Provincial Department of Public Works has a ferry cable across the river, and I would recommend that, if possible, the use of this be obtained. A stay-line, car, etc., would be required and measurements could be taken at all stages of flow. The interference with the ferry would not be serious, being only for the short time that the gaugings were actually being taken.

The discharge of the McLeod at the Wolf Creek ferry includes the discharges of Wolf Creek, Embarras River and Sundance Creek, so that unless special data were required on these streams, the necessity of measuring them would be obviated.

I did not visit the river at the town of Tollerton, about three miles south of Edsen, and there is the possibility of measurements there.

Embarras River.—The Embarras River joins the McLeod in S. W. ¼ Sec. 5, Tp. 52, Rge. 18, W. 5th Mer. It runs in a northerly direction and rises in Townships 48 and 49, Range 21 west of the 5th Meridian .



View of Upper Athabasca River Valley South of Jasper, Alberta.



View of Athabasca River above the Falls, South of Jasper, Alberta.



Jasper Lake (an Expansion of Athabasca River) and Miette Range of Mountains.



View of Upper Maligne River Valley.

The Alberta Coal Branch of the Grand Trunk Pacific Railway follows the valley of the Embarras practically to its source. I made one trip as far as "Mile 37", where I made a measurement of the river. The train ran at night, both going and coming, so that I am unable to say much of the country through which the river flows.

The mouth of the Embarras is about two miles east from the crossing of the McLeod. From July until October, I took discharge measurements at a point about a quarter of a mile above the mouth by wading the stream. The discharge varied from 550 to 150 second-feet. At the time of the higher discharge I had difficulty in wading, so that in high stages this would be impossible. The river here is about 210 feet wide and has a bed of gravel and small stones.

The discharge of the river at "Mile 37" Alberta Central Branch., in the middle of September was about 17 second-feet.

Sundance Creek.—Sundance Creek enters the McLeod River in N. W. ¼ Sec. 4. Tp. 53, Rge. 18, W. 5th Mer., at a point about nine miles southwest of Edson. The valley of the stream is fairly wide and of low gradient. I was unable to go any distance up the creek but it seems that it is fed from a lake, and this probably accounts for its comparative regularity of flow.

There is a pack road west from Edson, though in very poor shape, so that when I could secure horses I was able to visit the stream and measure its discharge by wading at a point about a quarter of a mile above its mouth. The discharge from July to October ranged from about 50 to 35 second-feet.

East of Edson.—Some distance east of Edson the railroad crosses the McLeod River at a point, where there seemed to be a good section, and a short distance farther on, what is known as Wolf Creek. To make a reconnaissance of these, I secured a team at Edson and drove eastward from there, some ten miles to the village of Wolf Creek.

The country east of Edson is a mixture of muskeg and parkland, and the streams consequently flow slowly and meander in every direction. There are two small streams in this district, the Edson River (Muskeg Creek, and Wolf Creek, and finally the main McLeod of which I have already spoken.

Edson River.—The Edson River, or what was formerly called "Muskeg Creek" is well described by the latter name. It flows through the muskeg and low country north and east of Edson, and reaches the McLeod River in Sec. 16, Tp. 54, Rge. 16, W. 5th Mer.

I first noticed the stream while driving from Edson to Wolf Creek, and measured the discharge at a point about a mile above its mouth. The river is about fifty feet wide, with a weedy bottom and sluggish flow. The discharge during August and September ranged from about 75 to 40 second-feet.

Wolf Creek.—Wolf Creek flows from the South and enters the McLeod River in Sec. 3, Tp. 54, Rge. 16, W. 5th Mer., about one hundred yards north of the railway bridge across the former stream.

I first measured the discharge of Wolf Creek in August, at a point under the bridge. At this time the stream was very high from recent rains, and I had great difficulty in wading it. The discharge at this stage was about 380 second-feet. The stream dropped considerably after this, and during September there was about fifty second-feet flowing.

I reached Wolf Creek by driving eastward from Edson, some ten miles to the village of Wolf Creek, then crossing the McLeod on the ferry and walking about two miles to the mouth of the creek.

Pembina River.—The Pembina River forms the second minor drainage channel. The Grand Trunk Pacific Railway crosses the divide between the McLeod, and Pembina basins in about Range 13, west of the 5th meridian.

The Pembina rises in Townships 46 and 47, Ranges 19 and 20, west of the 5th Meridian. and flows a northeasterly direction, joining the Athabasca in Tp. 66, Rge. 2, W. 5th Mer. I did not examine the river for any distance on either side of the railroad, but in this vicinity the district it drains is fairly high and wooded.

During the summer season I was unable to wade the Pembina at Entwistle, where it is crossed by the Grand Trunk Pacific Railway and so could not obtain a discharge measurement. Mr. G. H. Whyte visited the river during September, and thought that it might be possible to make arrangements with the Grand Trunk Pacific Railway to stretch a cable across the river, between the piers of the bridge. The bridge is about 200 feet high, and the piers at the bottom are solid concrete. The section at this point is uniform, and though rather deep, measurements here should prove satisfactory. If this were not possible, there is a place a short distance below the bridge, where a cable station could be fairly easily built. The river here is about 200 feet wide.

Lobstick River.—The Lobstick River joins the Pembina in Sec. 29, Tp. 53, Rge. 7, W. 5th Mer. It flows in an easterly direction, and west of Entwistle its course is followed for some distance by the Grand Trunk Pacific Railway. A large portion of the drainage area appears to be low and swampy.

Measurements of the discharge of the river were made by wading at a point about one hundred yards above its mouth during the early part of the season, but later the river became so high it was impossible to wade it.

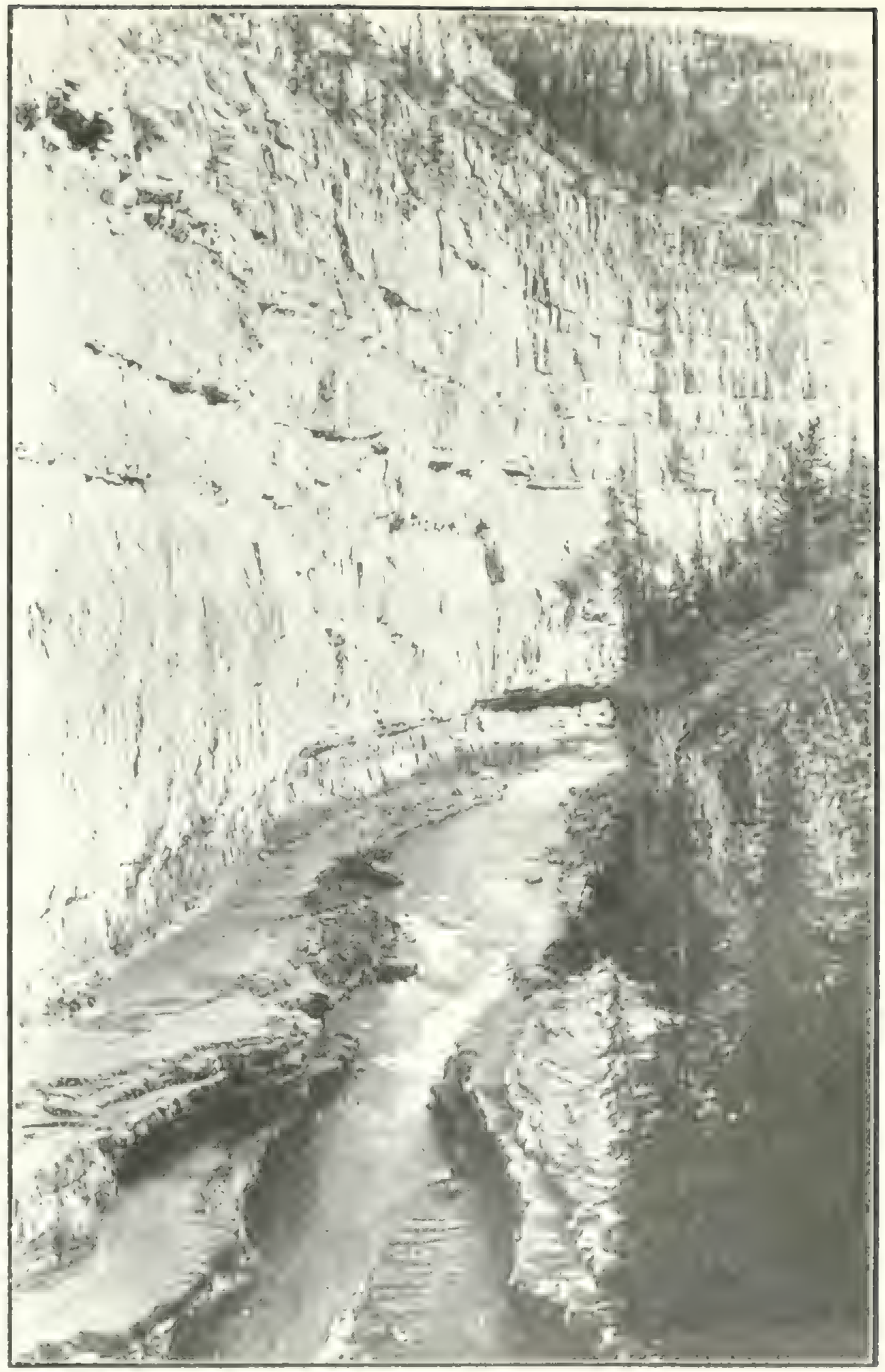
In searching for another section I found, some distance up stream, a bridge crossing to an abandoned coal mine. The section here is fairly good and measurements could be made at all stages, so I established a regular gauging station here and put in a staff gauge which was read twice daily by one of the villagers. This bridge is about two and a half mile northwest of Entwistle.

From May until October, the discharge of the Lobstick varied from 450 to 200 second-feet.

These last two rivers form the easterly limit of the "Athabasca Hydrographic District". The divide between the Athabasca and North Saskatchewan drainage areas lies in Range 6 or 7, west of the 5th Meridian, about five or six miles east of Entwistle.



Canyon on Maligne River.



Canyon on Rocky River.



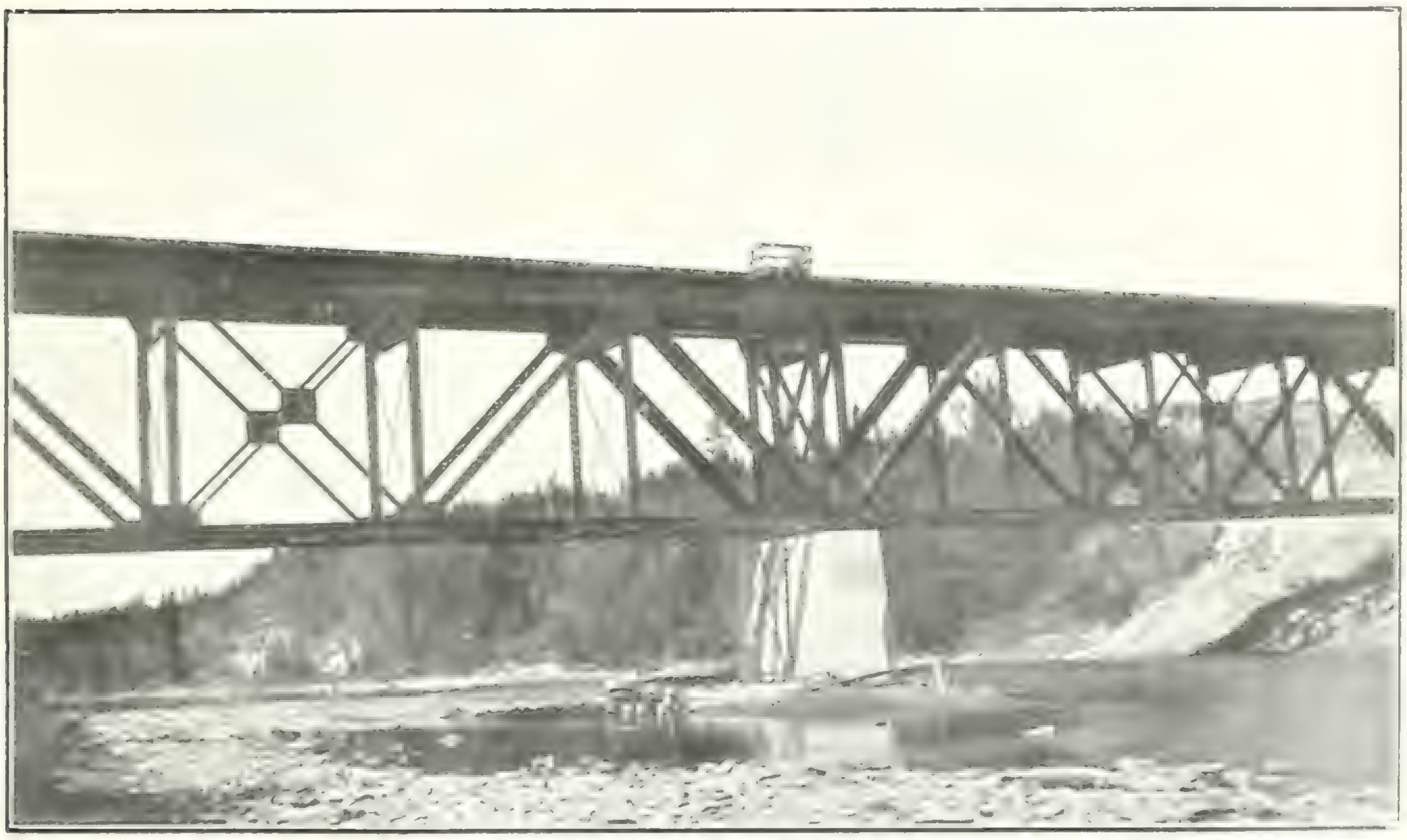
View of Stony River Valley near its Junction with Athabasca River



Headwaters of McLeod River (Mountain Park Pass.)



Big Bend in McLeod River near Edson, Alberta.



Grand Trunk Railway Bridge over McLeod River at Mile 6 on Alberta Coal Branch.

Department of the Interior
Canada

HON. ARTHUR MEIGHEN
MINISTER

W. J. STEWART
COMMISSIONER

IRRIGATION OFFICE

MAP SHOWING GAUGING STATIONS IN ALBERTA AND SASKATCHEWAN

SCALE 25 MILES TO 1 INCH

ROCKY MOUNTAINS

ALBERTA

SASKATCHEWAN

SIXTH MERIDIAN

INDEX

Page.

A

Acre foot:
definition of..... 17
Alberta Railway and Irrigation Company Canal near Kimball:
description..... 205
discharge measurement in 1913..... 206
daily gauge height and discharge, for 1913 206
monthly discharge, for 1913..... 207
Allison Creek (S.W. 11-8-5-5):
discharge measurements, in 1913..... 181
Anderson Ditch near Thelma:
description..... 250
Antelope Lake Drainage Basin:
general description..... 328
Athabasca District:
summary of work, for 1913..... 14
Athabasca District:
Report on, by Gordon J. Smith, B.A.... 401
Athabasca River drainage basin:
general description..... 27
miscellaneous discharge measurements, in 1913..... 35
Athabasca River at Athabasca:
description..... 34
discharge measurements, in 1913..... 35
Athabasca River at Jasper:
description..... 28
discharge measurements, in 1913..... 28
daily gauge height and discharge, for 1913 29
monthly discharge for 1913..... 30
Athabasca River (N.E. 5-51-25-5):
discharge measurements, in 1913..... 35
Athabasca River (Athabasca Falls):
discharge measurements in 1913..... 35
Athabasca River:
report on..... 401

B

Banff district:
summary of work, for 1913..... 8
Bath Creek (N.E. 32-28-16-5):
discharge measurements, in 1913..... 139
Bath Creek near Laggan:
description..... 69
discharge measurements, in 1913..... 69
daily gauge height and discharge, for 1913 70
monthly discharge, for 1913..... 70
Battle Creek Drainage Basin:
general description..... 262
miscellaneous discharge measurements, in 1913..... 281
Battle Creek at Nash's Ranche:
description..... 278
discharge measurements, in 1913..... 278
daily gauge height and discharge, for 1913 279
monthly discharge, for 1913..... 280
Battle Creek at Tenmile Police Detachment:
description..... 271
discharge measurements, in 1913..... 271
daily gauge height and discharge, for 1913 272
monthly discharge, for 1913..... 273
Battle Creek at Wilkes' Ranche:
description..... 275
discharge measurements, in 1913..... 276
daily gauge height and discharge, for 1913 276
monthly discharge, for 1913..... 277
Battle Creek (S.W. 9-7-29-3):
discharge measurements, in 1913..... 281
Battle Creek (N.W. 31-7-29-3):
discharge measurements, in 1913..... 281
Battle Creek (S.E. 21-6-29-3):
discharge measurement, in 1913..... 281
Battle Creek (Branch of, in N.W. 29-7-29-3):
discharge measurement, in 1913..... 281

Page.

Battle River at Battleford:
description..... 50
discharge measurements, in 1913..... 51
daily gauge height and discharge, for 1913 51
monthly discharge, for 1913..... 52
Battle River at Ponoka:
description..... 53
discharge measurements, in 1913..... 53
daily gauge height and discharge, for 1913 54
monthly discharge, for 1913..... 55
Bear Creek near Unsworth's Ranche:
description..... 341
discharge measurements, in 1913..... 342
daily gauge height and discharge, for 1913 342
monthly discharge, for 1913..... 343
Bear Creek, East Branch at Johnson's Ranche:
description..... 338
discharge measurements, in 1913..... 338
daily gauge height and discharge, for 1913 339
monthly discharge, for 1913..... 339
Bear Creek, East Branch of (N.E.29-10-23-3):
discharge measurements, in 1913..... 346
Bear Creek, West Branch at Bertram's Ranche:
description..... 339
discharge measurements, in 1913..... 340
daily gauge height and discharge, for 1913 340
monthly discharge, for 1913..... 341
Bear Creek, West Br. of, (N.W. 29-10-23-3):
discharge measurements, in 1913..... 346
Beargulch Creek (Sec. 19-2-9-4):
discharge measurements, in 1913..... 244
Beaupre Creek (N.E. 15-26-5-5):
discharge measurements, in 1913..... 139
Belanger Creek at Garrison's Ranche:
description..... 290
discharge measurements, in 1913..... 290
Belanger Creek at Oakes' Ranche:
description..... 290
discharge measurements, in 1913..... 290
daily gauge height and discharge, for 1913 291
monthly discharge, for 1913..... 292
Bellevue Creek, (N.E. 29-7-3-5):
discharge measurements, in 1913..... 181
Belly River Drainage Basin:
general description..... 186
Belly River near Lethbridge:
description..... 196
discharge measurements, in 1913..... 196
daily gauge height and discharge, for 1913 197
monthly discharge, for 1913..... 198
Belly River near Mountain View:
description..... 187
discharge measurements, in 1913..... 187
daily gauge height and discharge, for 1913 188
monthly discharge, for 1913..... 189
Belly River near Stand Off:
description..... 193
discharge measurements, in 1913..... 193
daily gauge height and discharge, for 1913 194
monthly discharge, for 1913..... 195
Bench marks:
description of..... 15
Berry Creek at Forster's Ranche:
description..... 68
Bighill Creek (S.W. 10-26-4-5):
discharge measurements, in 1913..... 139
Bigstick Lake Drainage Basin:
general description..... 351
miscellaneous discharge measurements, in 1913..... 362
Blacktail Creek (N.E. 30-6-23-3):
discharge measurement, in 1913..... 310
Blakiston Brook (N.E. 30-1-29-4):
discharge measurements, in 1913..... 186
Blindman River (N.W. 15-39-27-4):
discharge measurements, in 1913..... 68

Page.

Blood Indian Creek at Hallam's Ranche:
description..... 68
Bone Creek at Lewis'Ranche:
description..... 318
discharge measurements, in 1913..... 319
daily gauge height and discharge ,for 1913 319
monthly discharge, for 1913..... 320
Bone Creek (N.E. 10-11-20-3):
discharge measurement, in 1913..... 328
Boundary Creek at Fidler Bros. Ranche:
description..... 200
discharge measurements, in 1913..... 201
daily gauge height and discharge, for 1913 201
monthly discharge, for 1913..... 202
Boundary Creek (N.E. 27-1-26-4):
discharge measurement, in 1913..... 217
Bow River Drainage Basin:
general description..... 68
miscellaneous discharge measurements, in 1913..... 139
Bow River at Banff:
description..... 81
discharge measurements, in 1913..... 81
daily gauge height and discharge, for 1913 82
monthly discharge, for 1913..... 83
Bow River near Bassano:
description..... 137
discharge measurements, in 1913..... 137
daily gauge height and discharge, for 1913 138
monthly discharge, for 1913..... 138
Bow River at Calgary:
description..... 102
discharge measurements, in 1913..... 102
daily gauge height and discharge, for 1913 103
monthly discharge, for 1913..... 104
Bow River near Kananaskis:
description..... 90
discharge measurements, in 1913..... 90
daily gauge height and discharge, for 1913 91
monthly discharge, for 1913..... 92
Bow River at Laggan:
description..... 70
discharge measurements, in 1913..... 71
daily gauge height and discharge, for 1913 72
monthly discharge, for 1913..... 73
Bow River near Namaka:
description..... 135
discharge measurements, in 1913..... 136
daily gauge height and discharge, for 1913 136
monthly discharge, for 1913..... 137
Bow River (S.E. 28-28-16-5):
discharge measurement, in 1913..... 139
Bow River (S.W. 32-26-14-5):
discharge measurement, in 1913..... 139
Boxelder Creek at Young's Ranche:
description..... 367
discharge measurements, in 1913..... 368
daily gauge height and discharge for 1913 368
monthly discharge, for 1913..... 369
Brazeau River (Tp. 39-21-5):
discharge measurements, in 1913..... 59
Brazeau River (Outlet of Brazeau Lake):
discharge measurement, in 1913..... 59
Bridge Creek at Raymond's Ranche:
description..... 328
discharge measurements, in 1913..... 329
daily gauge height and discharge, for 1913 329
monthly discharge, for 1913..... 330
Bridge Creek at Gull Lake:
description..... 332
Bridge Creek near Skull Creek Post Office:
description..... 331
dishcarge measurements, in 1913..... 331
daily gauge height and discharge, for 1913 332
monthly discharge, for 1913..... 332
Bullshead Creek at Clark's Ranche:
description..... 375
discharge measurements, in 1913..... 376
daily gauge height and discharge, for 1913 376
monthly discharge, for 1913..... 377
Bullshead Creek near Dunmore:
description..... 378
discharge measurements, in 1913..... 378

C

Calf Creek (Sec. 4-8-22-3):
discharge measurement, in 1913..... 310
Calgary district:
summary of work in 1913..... 9

Page.

Canadian Pacific Railway Company Irrigation Canal at Ogden:
description..... 110
discharge measurements, in 1913..... 110
daily gauge height and discharge, for 1913 111
monthly discharge, for 1913..... 112
Canadian Pacific Railway Company Irrigation Canal near Kimball:
see Alberta Railway and Irrigation Canal near Kimball:
Canal Creek (Sec. 6-4-6-4):
discharge measurements, in 1913..... 247
Canyon Creek near Mountain Mill:
description..... 161
discharge measurements, in 1913..... 161
daily gauge height and discharge, for 1913 162
monthly discharge, for 1913..... 163
Cardston District:
summary of work in 1913..... 10
Cascade River at Bankhead:
description..... 87
discharge measurements, in 1913..... 87
daily gauge height and discharge, for 1913 88
monthly discharge, for 1913..... 89
Chalet Creek (see Louise Creek):
Changing Conditions:
of channel..... 23
Cheeseman Ditch near Coulee:
description..... 262
Christianson Ditch near Mountain View.....
description..... 192
discharge measurements, in 1913..... 192
daily gauge height and discharge, for 1913 192
monthly discharge, for 1913..... 192
Computations:
office..... 23
Concrete Coulee (N.W. 2-7-23-3):
discharge measurements, in 1913..... 310
Conferences:..... 16
Connelly Creek near Lundbreck:
description..... 171
discharge measurements, in 1913..... 171
Conventions and conferences:
held during 1913..... 16
Cottonwood Creek (S.W. 21-2-29-4):
discharge measurement, in 1913..... 186
Cow Creek near Cowley:
description..... 168
discharge measurements, in 1913..... 169
daily gauge height and discharge, for 1913 169
monthly discharge, for 1913..... 170
Crane Lake Drainage Basin:
general description..... 338
miscellaneous discharge measurements, in 1913..... 346
Creek (S.E. 34-11-29-4):
discharge measurement, in 1913..... 181
Crooked Creek near Waterton Mills:
description..... 184
discharge measurements, in 1913..... 185
daily gauge height and discharge, for 1913 185
monthly discharge, for 1913..... 186
Crowsnest River near Coleman:
description..... 178
discharge measurements, in 1913..... 179
daily gauge height and discharge, for 1913 179
monthly discharge, for 1913..... 180
Crowsnest River near Frank:
description..... 174
discharge measurements, in 1913..... 174
daily gauge height and discharge, for 1913 175
monthly discharge, for 1913..... 176
Crowsnest River near Lundbreck:
description..... 171
discharge measurements, in 1913..... 171
daily gauge height and discharge, for 1913 172
monthly discharge, for 1913..... 173
Current Meter Rating Station:..... 15
Current Meters:
rating..... 26
Curves:
rating..... 23
Cypress Creek (S.W. 17-9-27-3):
discharge measurement, in 1913..... 362
Cypress Lake Overflow, (S.E. 24-6-26-3):&
discharge measurements, in 1913..... 310

D

Dago Creek (S.W. 19-13-2-5):
discharge measurements, in 1913..... 181

Page.

Davis Creek at Drury's Ranche:
description..... 292
discharge measurements, in 1913..... 293
daily gauge height and discharge, for 1913 293
monthly discharge, for 1913..... 294
Deadhorse Creek (Sec. 4-2-11-4):
discharge measurements, in 1913..... 244
Deer Creek Cattle Company Irrigation Ditch:
description..... 242
Deer Creek (Sec. 15-1-12-4):
discharge measurements, in 1913..... 244
Deer Creek at Dickinson's Ranche:
description..... 242
Deer Creek, study of conditions of flow of:
discharge measurements, in 1913..... 243
Definitions:..... 17
Depth in inches:
definition of..... 17
Discharge:
slope method of determining..... 18
velocity method of determining..... 20
weir method of determining..... 19
daily in winter, estimates of..... 25
daily..... 23
monthly mean..... 23
Doyle Coulee (S.E. 17-7-22-3):
discharge measurements, in 1913..... 310
Drumm Creek (N.E. 18-7-3-5):
discharge measurements, in 1913..... 181
Dry Coulee (N.W. 16-6-24-3):
discharge measurement, in 1913..... 310
Drywood Creek (N.W. 18-4-29-4):
discharge measurement, in 1913..... 186

E

East Branch of Bear Creek:
(See Bear Creek).....
East Branch of Lodge Creek:
(See Lodge Creek).....
East Branch of Mackay Creek:
(see Mackay Creek).....
East Branch of Middle Creek:
(See Middle Creek).....
Eastern Cypress Hills district:
summary of work in 1913..... 12
Edmonton district:
summary of work in 1913..... 14
Edson River (S.E. 16-54-16-5):
discharge measurements, in 1913..... 35
Edson River (Athabasca Drainage Basin):
report on..... 405
Elbow River at Calgary:
description..... 105
discharge measurements, in 1913..... 105
daily gauge height and discharge, for 1913 106
monthly discharge, for 1913..... 107
Embarras River (Sec. 33-48-21-5):
discharge measurements, in 1913..... 35
Embarras River (S.W. 5-52-18-5):
discharge measurements, in 1913..... 35
Embarras River (Athabasca Drainage Basin):
report on..... 404
Ernst Creek (N.E. 26-10-3-5):
discharge measurement, in 1913..... 181
Equivalents:
List of convenient..... 18

F

Fairwell Creek at Drury's Ranche:
description..... 294
discharge measurements, in 1913..... 295
daily gauge height and discharge, for 1913 295
monthly discharge, for 1913..... 296
Fiddle Creek (Sec. 15-49-27-4):
discharge measurements, in 1913..... 35
Fiddle Creek (Athabasca Drainage Basin):
report on..... 403
Fidler Bros. Ditch at Boundary Creek:
description..... 199
discharge measurement, in 1913..... 199
daily gauge height and discharge, for 1913 200
monthly discharge, for 1913..... 200
Findlay and McDougal Ditch near High River:
description..... 126
discharge measurements, in 1913..... 127
Fish Creek near Priddis:
description..... 112
discharge measurements, in 1913..... 113
daily gauge height and discharge, for 1913 113
monthly discharge, for 1913..... 114

Page.

Fish Creek, North Branch (S.E. 22-22-3-5):
discharge measurements, in 1913..... 139
Fish Creek, South Branch (S.E. 22-22-3-5):
discharge measurements, in 1913..... 139
Foothill Creek (N.E. 29-4-29-4)..... 186
Fortier North Spring (S.E. 17-7-1-5):
discharge measurements, in 1913..... 181
Fortier South Spring (S.E 17-7-1-5):
discharge measurements, in 1913..... 181
Fortymile Creek near Banff:
description..... 78
discharge measurements, in 1913..... 78
daily gauge height and discharge, for 1913 79
monthly discharge, for 1913..... 80
Fourmile Coulee (S.E. 11-8-29-3):
discharge measurements, in 1913..... 281
Frenchman River Drainage Basin:
general description..... 281
Miscellaneous discharge measurements, for 1913..... 310
Frenchman River at Gordon's Ranche:
description..... 296
discharge measurements, in 1913..... 297
daily gauge height and discharge, for 1913 297
monthly discharge, for 1913..... 298
Frenchman River at Phillips' Ranche:
description..... 303
discharge measurements, in 1913..... 304
daily gauge height and discharge, for 1913 304
monthly discharge, for 1913..... 305
Frenchman River at Strong and Day's Ranche:
description..... 307
discharge measurements, in 1913..... 307
daily gauge height and discharge, for 1913 308
monthly discharge, for 1913..... 308
Frenchman River (Sec. 21-5-17-3):
discharge measurement, in 1913..... 310
Frenchman River, North Branch of, at Cross' Ranche:
description..... 301
discharge measurements, in 1913..... 301
daily gauge height and discharge, for 1913 302
monthly discharge, for 1913..... 303
Future Work..... 16

G

Gaft Ditch near Tenmile Police Detachment:
description..... 274
discharge measurements, in 1913..... 274
daily gauge height and discharge, for 1913 275
monthly discharge, for 1913..... 275
Gap Creek near Maple Creek:
description..... 360
discharge measurements, in 1913..... 360
daily gauge height and discharge, for 1913 361
monthly discharge, for 1913..... 361
Gap Creek at Small's Ranche:
description..... 355
discharge measurements, in 1913..... 356
daily gauge height and discharge, for 1913 356
monthly discharge, for 1913..... 357
Gauging stations:
description of..... 22
Ghost River at Gillies' Ranche:
description..... 96
discharge measurements, in 1913..... 96
daily gauge height and discharge, for 1913 97
monthly discharge, for 1913..... 98
Gilchrist Brothers' ditch near Kelvinhurst:
description..... 277
Gold Creek (S.E. 30-7-3-5):
discharge measurements, in 1913..... 182
Grand Valley Creek (S.W. 24-26-5-5-):
discharge measurements, in 1913..... 130
Grosventre Creek at Tothill's Farm:
description..... 371
discharge measurements, in 1913..... 372
daily gauge height and discharge, for 1913 372
monthly discharge, for 1913..... 373

H

Halfbreed Creek (Sec. 28-2-10-4):
discharge measurements, in 1913..... 214
Hay Creek at Fauquier's Ranche:
description..... 349
discharge measurements, in 1913..... 349
daily gauge height and discharge, for 1913 350
monthly discharge, for 1913..... 350

Page.

Hay Creek at Hay Creek School:
description..... 346
discharge measurements, in 1913..... 346
daily gauge height and discharge, for 1913 347
monthly discharge, for 1913..... 348
Hay Lake Drainage Basin:
general description..... 346
miscellaneous discharge measurements, in 1913..... 351
Healey Creek (S.W. 29-25-12-5):
discharge measurement, in 1913..... 139
Highwood River near Aldersyde:
description..... 133
discharge measurements, in 1913..... 133
daily gauge height and discharge, for 1913 134
monthly discharge, for 1913..... 135
Highwood River, North Branch at Brown's Ranche:
description..... 120
discharge measurements, in 1913..... 121
daily gauge height and discharge, for 1913 121
monthly discharge, for 1913..... 122
Highwood River at High River:
description..... 130
discharge measurements, in 1913..... 130
daily gauge height and discharge, for 1913 131
monthly discharge, for 1913..... 132
Hooper and Huckvale Irrigation Ditch:
description..... 247
Horse Creek (N.E. 8-26-4-5):
discharge measurements, in 1913..... 139

I

Introduction..... 7
Ice:
formation of, and conditions..... 24

J

Jim Creek (N.E. 6-15-1-5):
discharge measurement, in 1913..... 182
Jones Creek at Read's Ranche:
description..... 314
discharge measurements, in 1913..... 315
Jones Creek (S.W. 12-15-14-3):
discharge measurements, in 1913..... 328
Jones Creek (S.W. 19-15-13-3):
discharge measurements, in 1913..... 328
Jones Creek at Stearn's Ranche:
description..... 315
discharge measurements, in 1913..... 315
daily gauge height and discharge, for 1913 316
monthly discharge for 1913..... 316
Jones Creek (S.W. 8-8-20-3):
discharge measurements, in 1913..... 328
Jumpingpound Creek near Jumping Pound:
description..... 99
discharge measurements, in 1913..... 99
daily gauge height and discharge, for 1913 100
monthly discharge, for 1913..... 101

K

Kananaskis River near Kananaskis:
description..... 93
discharge measurements, in 1913..... 93
daily gauge height and discharge, for 1913 94
monthly discharge, for 1913..... 95
Kennedy Creek (Br. of Milk River) (Sec. 3-1-5-4):
discharge measurements, in 1913..... 244
Ketchum Creek (Sec. 16-4-6-4):
discharge measurements, in 1913..... 247

L

Lake Louise, Tailrace of Power House (N.W. 21-28-16-5):
discharge measurements, in 1913..... 139
Lake of the Narrows Drainage Basin:
general description..... 333
Lee Creek at Cardston:
description..... 210
discharge measurements, in 1913..... 210
daily gauge height and discharge, for 1913 211
monthly discharge, for 1913..... 212
Lee Creek at Layton's Ranche:
description..... 212
discharge measurements, in 1913..... 213
daily gauge height and discharge, for 1913 213
monthly discharge, for 1913..... 214

Page.

Lindner Ditch near Battle Creek:
description..... 267
daily gauge height and discharge, for 1913 267
monthly discharge, for 1913..... 268
Lineham Spillway (N.W. 6-19-28-4):
discharge measurements, in 1913..... 139
Little Bow Ditch at High River:
description..... 127
discharge measurements, in 1913..... 127
daily gauge height and discharge, for 1913 128
monthly discharge, for 1913..... 129
Little Bow River Drainage Basin:
general description..... 140
miscellaneous discharge measurements, in 1913..... 144
Lobstick River near Entwistle:
description..... 33
discharge measurements, in 1913..... 33
daily gauge height and discharge, for 1913 34
monthly discharge, for 1913..... 34
Lobstick River (Athabasca Drainage Basin):
report on..... 406
Lodge Creek Drainage Basin:
general description..... 248
miscellaneous discharge measurements, in 1913..... 262
Lodge Creek at Hartt's Ranche:
description..... 250
discharge measurements, in 1913..... 250
daily gauge height and discharge, for 1913 250
monthly discharge, for 1913..... 251
Lodge Creek at Hester's Ranche:
description..... 251
discharge measurements, in 1913..... 252
daily gauge height and discharge, for 1913 252
monthly discharge, for 1913..... 253
Lodge Creek at Willow Creek Police Detachment:
description..... 260
discharge measurements, in 1913..... 260
daily gauge height and discharge, for 1913 261
monthly discharge, for 1913..... 261
Lodge Creek, East Br. at English's Ranche:
description..... 248
discharge measurements, in 1913..... 248
daily gauge height and discharge, for 1913 249
monthly discharge, for 1913..... 249
Lodge Creek (N.E. (36-4-2-4):
discharge measurement, in 1913..... 262
Lonepine Creek at Hewitt's Ranche:
description..... 287
discharge measurements, in 1913..... 287
daily gauge height and discharge, for 1913 288
monthly discharge, for 1913..... 289
Long Creek near Estevan:
description..... 389
discharge measurements, in 1913..... 389
daily gauge height and discharge, for 1913 390
monthly discharge, for 1913..... 391
Louise Creek near Laggan:
description..... 76
discharge measurements, in 1913..... 77
daily gauge height and discharge, for 1913 77
monthly discharge, for 1913..... 78
Low Velocity Limitations..... 22
Lyon Creek (Sec. 39-7-4-5):
discharge measurement, in 1913..... 182

M

Mackay Creek at Walsh:
description..... 366
discharge measurements, in 1913..... 366
daily gauge height and discharge, for 1913 367
monthly discharge, for 1913..... 367
Mackay Creek, East Branch at Grant's Ranche:
description..... 362
discharge measurements, in 1913..... 363
daily gauge height and discharge, for 1913 363
monthly discharge, for 1913..... 364
Mackie Creek (Sec. 19-2-18-4):
discharge measurements, in 1913..... 214
Macleod District:
summary of work in 1913..... 9
Maligne River (Tp. 45-28-5):
discharge measurements, in 1913..... 35
Mami Creek near Mountain View:
description..... 189
discharge measurements, in 1913..... 190
daily gauge height and discharge, for 1913 190
monthly discharge, for 1913..... 191

Page.

Manyberries Creek at Hooper and Huckvale's Ranche:
description..... 245
discharge measurements, in 1913..... 245
daily gauge height and discharge, for 1913 246
monthly discharge, for 1913..... 246
Many Island Lake Drainage Basin:
general description..... 362
Maple Creek at Maple Creek:
description..... 351
discharge measurements, in 1913..... 352
daily gauge height and discharge, for 1913 352
monthly discharge, for 1913..... 353
Maple Creek near Maple Creek:
description..... 353
discharge measurements, in 1913..... 353
daily gauge height and discharge, for 1913 354
monthly discharge, for 1913..... 355
Maple Creek, (N.W. 23-14-26-3):
discharge measurements, in 1913..... 362
Maple Creek (Town) water main (S.E. 20-10-25-3):
discharge measurements, in 1913..... 351
Marshall & Gaff Ditch near Tenmile Police Detachment:
description..... 274
discharge measurements, in 1913..... 274
McGillivray Creek near Coleman:
description..... 177
discharge measurements, in 1913..... 177
daily gauge height and discharge, for 1913 178
monthly discharge, for 1913..... 178
McLeod River (Sec. 33-52-17-5):
discharge measurement, in 1913..... 35
McLeod River (N.W. 5-52-18-5):
discharge measurements, in 1913..... 35
McLeod River (N.W. 3-54-16-5):
discharge measurements, in 1913..... 35
McLeod River (Athabasca Drainage Basin):
report on..... 404
McShane Creek at Small's Ranche:
description..... 358
discharge measurements, in 1913..... 358
daily gauge height and discharge, for 1913 359
monthly discharge, for 1913..... 360
Mean Discharge:
monthly..... 23
Mean Velocity:
methods of measuring..... 21
vertical velocity curve method of determining..... 21
three-point method of determining..... 21
two-point method of determining..... 21
single-point method of determining..... 21
integration method of determining..... 22
Middle Creek at Hammond's Ranche:
description..... 258
discharge measurements, in 1913..... 258
daily gauge height and discharge, for 1913 259
monthly discharge, for 1913..... 259
Middle Creek at McKinnon's Ranche:
description..... 253
discharge measurements, in 1913..... 253
daily gauge height and discharge, for 1913 254
monthly discharge, for 1913..... 255
Middle Creek at Ross' Ranche:
description..... 255
discharge measurements, in 1913..... 256
daily gauge height and discharge, for 1913 256
monthly discharge, for 1913..... 257
Middle Creek (S.W. 9-4-29-3):
discharge measurements, in 1913..... 262
Middle Creek (S.E. 33-5-1-4):
discharge measurements, in 1913..... 262
Miette River near Jasper:
description..... 27
discharge measurements, in 1913..... 28
Miette River (Athabasca Drainage Basin):
report on..... 402
Milk River Drainage Basin:
general description..... 217
miscellaneous discharge measurements, in 1913..... 244
study of conditions of run-off, for 1913... 241
Milk River District:
summary of work in 1913..... 11
Milk River at Milk River:
description..... 229
discharge measurements, in 1913..... 229
daily gauge height and discharge, for 1913 230
monthly discharge, for 1913..... 231

Page.

Milk River at Pendant d'Oreille Police Detachment:
description..... 235
discharge measurements, in 1913..... 235
daily gauge height and discharge, for 1913 236
monthly discharge, for 1913..... 237
Milk River at Spencer's Lower Ranche:
description..... 238
discharge measurements, in 1913..... 238
daily gauge height and discharge, for 1913 239
monthly discharge, for 1913..... 240
Milk River at Writing-on-Stone Police Detachment:
description..... 232
discharge measurements, in 1913..... 232
daily gauge height and discharge, for 1913 233
monthly discharge, for 1913..... 234
Milk River, North Br. near Mackie's Ranche:
description..... 222
discharge measurements, in 1913..... 223
Milk River, North Branch near Peters' Ranche:
description..... 217
discharge measurements, in 1913..... 218
daily gauge height and discharge, for 1913 219
monthly discharge, for 1913..... 220
Milk River, South Branch at Croff's Ranche:
description..... 223
discharge measurements, in 1913..... 223
daily gauge height and discharge, for 1913 224
monthly discharge, for 1913..... 225
Milk River, North Br. at Knight's Ranche:
description..... 221
discharge measurements, in 1913..... 221
daily gauge height and discharge, for 1913 222
monthly discharge, for 1913..... 222
Milk River, South Br. at Mackie's Ranche:
description..... 226
discharge measurements, in 1913..... 226
daily gauge height and discharge, for 1913 227
monthly discharge, for 1913..... 228
Mill Creek near Mountain Mill:
description..... 159
discharge measurements, in 1913..... 160
daily gauge height and discharge, for 1913 160
monthly discharge, for 1913..... 161
Miners Creek (Sec. 10-2-11-4):
discharge measurements, in 1913..... 244
Miners Creek (Sec. 11-2-11-4):
discharge measurements, in 1913..... 244
Miners Creek (Sec. 11-1-11-4):
discharge measurements, in 1913..... 244
Mink Creek (S.E. 31-7-29-3):
discharge measurements, in 1913..... 281
Mink Creek (S.E. 21-7-29-3):
discharge measurement, in 1913..... 281
Mitchell Ditch (N.E. 23-14-26-3):
discharge measurements, in 1913..... 362
Moosejaw Creek Drainage Basin:
general description..... 384
miscellaneous discharge measurements, in 1913..... 389
Moosejaw Creek at Chevrier's Farm:
description..... 385
discharge measurements, in 1913..... 386
Moosejaw Creek near Lang:
description..... 384
discharge measurements, in 1913..... 384
daily gauge height and discharge, for 1913 385
monthly discharge, for 1913..... 385
Moosejaw Creek at McCarthy's Farm:
description..... 386
discharge measurements, in 1913..... 386
daily gauge height and discharge, for 1913 387
monthly discharge, for 1913..... 388
Moosejaw Creek (N.E. 15-15-25-2):
discharge measurements, in 1913..... 389
Moose Mountain Creek near Oxbow:
description..... 394
discharge measurements, in 1913..... 395
daily gauge height and discharge, for 1913 395
monthly discharge, for 1913..... 396
Morrison Brothers Ditch:
description..... 309
discharge measurements, in 1913..... 309
daily gauge height and discharge, for 1913 309
monthly discharge, for 1913..... 310
Morrison Creek (N.W. 7-8-2-2):
discharge measurements, in 1913..... 400

Page.

Mosquito Creek near Nanton:
description..... 140
discharge measurements, in 1913..... 141
daily gauge height and discharge, for 1913 141
monthly discharge, for 1913..... 142
Muddypound Creek at Hart's Ranche:
description..... 146
discharge measurements, in 1913..... 147
daily gauge height and discharge, for 1913 147
monthly discharge, for 1913..... 148
Mule Creek (S.E. 34-5-17-3):
discharge measurements, in 1913..... 310
Muskeg Creek (See Edson River):

N

Nanton Creek near Nanton·
description..... 142
discharge measurements, in 1913..... 143
daily gauge height and discharge, for 1913 143
monthly discharge, for 1913..... 144
Nez Percé Creek (N.E. 17-8-4-5):
discharge measurements, in 1913..... 182
North Branch of Fish Creek:
(see Fish Creek).....
North Branch of Frenchman River:
(see Frenchman River).....
North Branch of Milk River:
(see Milk River).....
North Branch of Sheep River at Millarville:
(see Sheep River).....
North Saskatchewan River Drainage Basin:
general description..... 36
miscellaneous discharge measurements, in 1913..... 59
North Saskatchewan River at Battleford:
description..... 42
discharge measurements, in North Channel, in 1913..... 42
daily gauge height and discharge of North Channel, for 1913..... 43
monthly discharge of North Channel, for 1913..... 44
discharge measurements of South Channel in 1913..... 45
daily gauge height and discharge of South Channel, for 1913..... 45
monthly discharge of South Channel, for 1913..... 46
monthly discharge, for 1913..... 47
North Saskatchewan River at Prince Albert:
description..... 37
discharge measurements, in 1913..... 37
daily gauge height and discharge, for 1913 38
monthly discharge, for 1913..... 39
daily gauge height and discharge, for 1910 40
daily gauge height and discharge, for 1911 41
monthly discharge, for 1910-11..... 41
North Saskatchewan River at Edmonton:
description..... 47
discharge measurements, in 1913..... 48
daily gauge height and discharge, for 1913 48
monthly discharge, for 1913..... 49
North Saskatchewan River at Rocky Mountain House:
description..... 50
daily gauge heights, for 1913..... 50
Nose Creek near Calgary:
description..... 107
discharge measurements, in 1913..... 108
daily gauge height and discharge, for 1913 108
monthly discharge, for 1913..... 109

O

Office computations..... 23
Office Work:
summary of, in 1913..... 15
Oil Creek (S.W. 23-1-30-4):
discharge measurements, in 1913..... 186
Oldman River Drainage Basin:
general description..... 144
miscellaneous discharge measurements, in 1913..... 181
Oldman River near Cowley:
description..... 163
discharge measurements, in 1913..... 164
daily gauge height and discharge, for 1913 164
monthly discharge, for 1913..... 165

Page.

Oldman River near Macleod:
description..... 151
discharge measurements, in 1913..... 151
daily gauge height and discharge, for 1913 152
monthly discharge, for 1913 153
Organization:
in 1913..... 7
Oxarart Creek at Wylie's Ranche:
description..... 282
discharge measurements, in 1913..... 282
daily gauge height and discharge, for 1913 283
monthly discharge, for 1913..... 284

P

Pakowki Lake Drainage Basin:
general description..... 245
miscellaneous discharge measurements, in 1913..... 247
Pearce's Ditch (N.W. 2-7-23-3):
discharge measurement, in 1913..... 310
Petrified Coulee (N.E. 7-20-22-3):
discharge measurements, in 1913..... 310
Pekisko Creek at Pekisko:
description..... 122
discharge measurements, in 1913..... 123
daily gauge height and discharge, for 1913 123
monthly discharge, for 1913 124
Pembina River (S.W. 20-53-7-5):
discharge measurements, in 1913..... 35
Pembina River (Athabasca Drainage Basin):
report on..... 405
Piapot Creek at Cumberland's Ranche:
description..... 343
discharge measurements, in 1913..... 344
daily gauge height and discharge, for 1913 344
monthly discharge, for 1913..... 345
Pigeon Creek (Outlet of Pigeon Lake):
discharge measurements, in 1913..... 59
Pincher Creek at Pincher Creek:
description..... 154
discharge, measurements in 1913..... 154
daily gauge height and discharge, for 1913 155
monthly discharge, for 1913..... 156
Pine Creek (N.E. 11-22-1-5):
discharge measurements, in 1913..... 140
Pine Creek (N.W. 21-3-29-4):
discharge measurements, in 1913..... 186
Pipestone River near Laggan:
description..... 74
discharge measurements, in 1913..... 74
daily gauge height and discharge, for 1913 75
monthly discharge, for 1913..... 76
Playle Creek (S.W. 32-11-1-5):
discharge measurements, in 1913..... 182
Police Creek (Sec. 35-1-13-4):
discharge measurements, in 1913..... 244
Pollock Ditch near Southfork:
description..... 311
discharge measurement, in 1913..... 311
daily gauge height and discharge, for 1913 311
monthly discharge, for 1913..... 312
Prairie Creek (N.E. 5-51-25-5):
discharge measurements, in 1913..... 35
Prairie Creek (Athabasca Drainage Basin):
report on..... 404

Q

Qu'Appelle River Drainage Basin:
general description..... 381
Ou'Appelle River at Lumsden:
description..... 381
discharge measurements, in 1913..... 381
daily gauge height and discharge, for 1913 382
monthly discharge, for 1913..... 383

R

Rating Current meters:
method of..... 26
Rating tables:
construction of..... 23
Red Deer River Drainage Basin:
general description..... 65
miscellaneous discharge measurements, in 1913..... 68
Red Deer River at Red Deer:
description..... 65
discharge measurements, in 1913..... 66
daily gauge height and discharge, for 1913 66
monthly discharge, for 1913..... 67

Page.

Red Creek (Sec. 18-1-15-4):
discharge measurements, in 1913..... 244
Rocky Creek (S.E. 6-8-27-3):
discharge measurement, in 1913..... 310
Rocky River near Hawes:
description..... 31
discharge measurements, in 1913..... 31
daily gauge height and discharge, for 1913 32
monthly discharge, for 1913..... 32
Rocky River (Athabasca Drainage Basin):
report on..... 403
Rolph Creek near Kimball:
description..... 207
discharge measurements, in 1913..... 207
daily gauge height and discharge, for 1913 208
monthly discharge, for 1913..... 209
Rose Creek at East End:
description..... 298
discharge measurements, in 1913..... 298
daily gauge height and discharge, for 1913 299
monthly discharge, for 1913..... 300
Ross Creek Drainage Basin:
general description..... 369
Ross Creek at Irvine:
description..... 373
discharge measurements, in 1913..... 374
daily gauge height and discharge, for 1913 374
monthly discharge, for 1913..... 375
Ross Creek at Robinson's Ranche:
description..... 369
discharge measurements, in 1913..... 370
daily gauge height and discharge, for 1913 370
monthly discharge, for 1913..... 371
Run-off:
computations of..... 23

S

Sage Creek Drainage Basin:
general description..... 247
Sage Creek at Wild Horse Police Detachment:
description..... 247
Saskatoon district:
summary of work, for 1913..... 13
Saunders springs, (S.E. 20-10-25-3):
discharge measurements, in 1913..... 351
Second-foot (Sec.-ft.):
definition of..... 17
Scope of Work:..... 7
Sevenpersons River Drainage Basin:
general description..... 379
Sevenpersons River at Medicine Hat:
description..... 379
discharge measurements, in 1913..... 379
daily gauge height and discharge, for 1913 380
monthly discharge, for 1913..... 380
Sheep River near Okotoks:
description..... 118
discharge measurements, in 1913..... 119
daily gauge height and discharge, for 1913 119
monthly discharge, for 1913..... 120
Sheep River, South Br. near Black Diamond:
description..... 116
discharge measurements, in 1913..... 117
daily gauge height and discharge, for 1913 117
monthly discharge, for 1913..... 118
Sheep River, North Branch at Millarville:
description..... 114
discharge measurements, in 1913..... 115
daily gauge height and discharge, for 1913 115
monthly discharge, for 1913..... 116
Sixmile Coulee at Spangler's Ranche:
description..... 264
discharge measurements, in 1913:..... 264
daily gauge height and discharge, for 1913 265
monthly discharge, for 1913..... 266
Sixmile Coulee (S.W. 6-7-28-3):
discharge measurements, in 1913..... 281
Skull Creek at Doyle's Ranche:
description..... 333
discharge measurements, in 1913..... 333
daily gauge height and discharge, for 1913 334
monthly discharge, for 1913..... 335
Skull Creek near Skull Creek:
description..... 335
discharge measurements, in 1913..... 336
daily gauge height and discharge, for 1913 336
monthly discharge, for 1913..... 337
Snaring River (N.W. 33-46-1-6):
discharge measurements, in 1913..... 36

Page.

Snaring River (Athabasca Drainage Basin):
report on..... 403
Souris River Drainage Basin:
general description..... 389
miscellaneous discharge measurements, in 1913..... 400
Souris River near Estevan:
description..... 392
discharge measurements, in 1913..... 392
daily gauge height and discharge, for 1913 393
monthly discharge, for 1913..... 394
Souris River near Glen Ewen:
description..... 396
discharge measurements, in 1913..... 396
daily gauge height and discharge, for 1913 397
monthly discharge, for 1913..... 398
Souris River near Melita:
description..... 399
discharge measurements, in 1913..... 399
daily gauge height and discharge, for 1913 399
monthly discharge, for 1913..... 400
Souris River (S.W. 15-2-8-2):
discharge measurements, in 1913..... 400
South Branch of Fish Creek:
(see Fish Creek)
South Branch of Milk River:
(see Milk River)
South Branch of Sheep River near Black Diamond:
(see Sheep River)
South Fork River near Cowley:
description..... 157
discharge measurements, in 1913..... 157
daily gauge height and discharge, for 1913 158
monthly discharge, for 1913..... 159
South Saskatchewan River Drainage Basin:
general description..... 59
South Saskatchewan River at Medicine Hat:
description..... 62
discharge measurements, in 1913..... 62
daily gauge height and discharge, for 1913 63
monthly discharge, for 1913..... 64
South Saskatchewan River at Saskatoon:
description..... 59
discharge measurements, in 1913..... 60
daily gauge height and discharge, for 1913 60
monthly discharge, for 1913..... 61
Spangler Ditch near Battle Creek:
description..... 262
discharge measurements, in 1913..... 263
daily gauge height and discharge, for 1913 263
monthly discharge, for 1913..... 263
Spencer Creek (S.E. 18-26-5-5):
discharge measurements, in 1913..... 140
Spillway on Highwood River (N.W. 6-19-28-4 Lineham's):
discharge measurements, in 1913..... 139
Spray Lakes Overflow (Sec. 30-22-10-5):
discharge measurement, in 1913..... 140
Spray River near Banff:
description..... 84
discharge measurements, in 1913..... 84
daily gauge height and discharge, for 1913 85
monthly discharge, for 1913..... 86
Spray River (Sec. 30-22-10-5):
discharge measurements, in 1913..... 140
Spring (N.W. 26-11-30-4):
discharge measurements, in 1913..... 181
Spring (N.E. 10-17-1-5):
discharge measurements, in 1913..... 144
Spring Creek (N.W. 9-9-20-3):
discharge measurements, in 1913..... 328
Spring Creek (N.E. 7-7-22-3):
discharge measurement, in 1913..... 310
Spring Creek (S.E. 10-10-25-3):
discharge measurements, in 1913..... 351
Spring Creek (S.W. 3-7-29-3):
discharge measurement, in 1913..... 281
Spring Creek (N.E. 21-7-29-3):
discharge measurement, in 1913..... 281
Spring Creek (S.E. 11-8-29-3):
discharge measurement, in 1913..... 281
Spring Creek (N.E. 9-11-28-4):
discharge measurement, in 1913..... 182
Spring Creek (N.W. 23-11-30-4):
discharge measurements, in 1913..... 182
Spring Creek (S.W. 7-12-1-5):
discharge measurement, in 1913..... 182
Spring Creek (S.E. 6-12-1-5):
discharge measurement, in 1913..... 182

Page.

Spring Creek (N.E.15-20-1-5):
discharge measurement, in 1913..... 140
Spring Creek (S.W. 19-20-1-5):
discharge measurement, in 1913..... 140
Spring Creek (N.E. 10-17-1-5):
discharge measurements, in 1913..... 140
Spring Creek (S.E. 16-14-2-5):
discharge measurement ,in 1913..... 182
Spring Creek (N.E. 27-10-3-5):
discharge measurement, in 1913..... 182
Starks and Burton Ditch near Woolchester:
description..... 378
discharge measurement, in 1913..... 378
Stations, Gauging:
description of.....
Stimson Creek near Pekisko:
description..... 124
discharge measurements, in 1913..... 125
daily gauge height and discharge, for 1913 125
monthly discharge, for 1913..... 126
Stirling and Nash Ditch near Kelvinhurst:
description..... 278
discharge measurement, in 1913..... 278
St. Mary River Drainage Basin:
general description..... 199
miscellaneous discharge measurements, in 1913..... 217
St. Mary River near Kimball:
description..... 202
discharge measurements, in 1913..... 203
daily gauge height and discharge, for 1913 204
monthly discharge, for 1913..... 205
St. Mary River at Whitney's Ranche:
description..... 214
discharge measurements, in 1913..... 215
daily gauge height and discharge, for 1913 215
monthly discharge, for 1913..... 216
St. Mary River (S. W. 11-3-25-4):
discharge measurments, in 1913..... 217
Stoney River, (Tp. 48-28-5):
discharge measurements, in 1913..... 36
Stoney River (Athabasca Drainage Basin):
report on..... 403
Stream flow
methods of measuring..... 18
Strong and Day's Ditch near East End:
description..... 305
discharge measurements, in 1913..... 306
daily gauge height and discharge, for 1913 306
monthly discharge, for 1913..... 307
Sturgeon River near Fort Saskatchewan:
description..... 55
discharge measurements, in 1913..... 56
Sturgeon River at St. Albert:
description..... 56
discharge measurements, in 1913..... 56
daily gauge height and discharge, for 1913 57
monthly discharge, for 1913..... 58
Sucker Creek at Whitcomb and Zeigler's Ranche:
description..... 284
discharge measurements, in 1913..... 285
daily gauge height and discharge, for 1913 285
monthly discharge, for 1913..... 286
Summit Creek near Crowsnest:
description..... 181
discharge measurements, in 1913..... 181
Sundance Creek (N.W. 4-53-18-5):
discharge measurements, in 1913..... 36
Sundance Creek (Athabasca Drainage Basin):
report on..... 405
Swiftcurrent Creek Drainage Basin:
general description..... 310
miscellaneous discharge measurements, in 1913..... 328
Swiftcurrent Creek at Pollock's Ranche:
description..... 312
discharge measurements, in 1913..... 312
daily gauge height and discharge, for 1913 313
monthly discharge, for 1913..... 314
Swiftcurrent Creek at Sinclair's Ranche (Lower Station):
description..... 320
discharge measurements, in 1913..... 321
daily gauge height and discharge, for 1913 321
monthly discharge, for 1913..... 322
Swiftcurrent Creek at Sinclair's Ranche (Upper Station):
description..... 316
discharge measurements, in 1913..... 317
daily gauge height and discharge, for 1913 317
monthly discharge, for 1913..... 318

Page.

Swiftcurrent Creek at Swift Current:
description..... 325
discharge measurements, in 1913..... 325
daily gauge height and discharge, for 1913 326
monthly discharge, for 1913..... 327
Swiftcurrent Creek near Swift Current:
description..... 322
discharge measurements, in 1913..... 323
daily gauge height and discharge, for 1913 323
monthly discharge, for 1913..... 324
Swiftcurrent Creek (S.E. 24-15-14-3):
discharge measurements, in 1913..... 328

T

Tables:
explanation and use of..... 17
rating..... 23
Tenmile Creek at Tenmile Police Detachment:
description..... 268
discharge measurements, in 1913..... 268
daily gauge height and discharge, for 1915 269
monthly discharge, for 1913..... 270
Thunder Creek (Moose Jaw):
discharge measurement, in 1913..... 389
Todd Creek at Elton's Ranche:
description..... 166
discharge measurements, in 1913..... 166
daily gauge height and discharge, for 1913 167
monthly discharge, for 1913..... 168
Tongueflag Creek (S.E. 24-19-29-4):
discharge measurements, in 1913..... 140
Trout Creek at Lockwood's Ranche:
description..... 144
discharge measurements, in 1913..... 145
daily gauge height and discharge, for 1913 145
monthly discharge, for 1913..... 146

V

Velocity:
low limitations of..... 22
Vermilion River (N.W. 32-50-6-4):
discharge measurements, in 1913..... 59
Vermilion Creek (S.W. 32-26-14-5):
discharge measurement, in 1913..... 140

W

Waterton River Drainage Basin:
general description..... 182
miscellaneous discharge measurements, in 1913..... 186
Waterton River at Waterton Mills:
description..... 182
discharge measurements, in 1913..... 183
daily gauge height and discharge, for 1913 183
monthly discharge, for 1913..... 184
West Br. of Bear Creek at Bertram's Ranche:
(see Bear Creek).....
West Branch of Mackay Creek:
(see Mackay Creek).....
Western Cypress Hills district:
summary of work, in 1913..... 11
Whirlpool River (Athabasca Drainage Basin):
report on..... 402
Whitemud Coulee (S.W. 26-7-29-3):
discharge measurements, in 1913..... 281
Willow Creek near Macleod:
description..... 148
discharge measurements, in 1913..... 149
daily gauge height and discharge, for 1913 149
monthly discharge, for 1913..... 150
Willow Creek (S.W. 36-12-28-4):
discharhe measurements, in 1913..... 182
Winler observations..... 24
Winter records:
measurements and computations of..... 24
Winter stations:
selection of..... 24
Wolf Creek (S.W. 3-54-16-5):
discharge measurements, in 1913..... 36
Wolf Creek (Athabasca Drainage Basin):
report on..... 405

Y

Yarrow Creek (S.E. 18-4-28-4):
discharge measurements, in 1913..... 186
York Creek (S.E. 30-7-3-5);
discharge measurements, in 1913..... 182